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THESIS

ANALYSIS OF THE *UNIFORM BUILDING CODE*

by

Karen F.M. Natsuhara

and

Roger M. Natsuhara

December, 1989

Thesis Advisor: Paul M. Carrick

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Unclassified

ECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b RESTRICTIVE MARKINGS
a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
b DECLASSIFICATION/DOWNGRADING SCHEDULE	
PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
a NAME OF PERFORMING ORGANIZATION Naval Postgraduate School	6b OFFICE SYMBOL (If applicable) Code 54
7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School	
c. ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000	7b ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000
a NAME OF FUNDING/SPONSORING ORGANIZATION	8b OFFICE SYMBOL (If applicable)
9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
c. ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO

11 TITLE (Include Security Classification)
ANALYSIS OF THE "UNIFORM BUILDING CODE" (UNCLASSIFIED)

12 PERSONAL AUTHOR(S)
Natsuhara, Karen F.M. and Natsuhara, Roger M.

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Master's Thesis	FROM ________ TO ______	1989 December	143

16 SUPPLEMENTARY NOTATION
The views expressed in this thesis are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Economics, Standards, Standardizing, Guide Specifications, Construction, Building Codes, Technical Manuals, Military Handbooks, Federal Construction Specifications.

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This thesis examined and analyzed the International Conference of Building Officials (ICBO) who produces a public good, the "Uniform Building Code." The "Uniform Building Code" is one of the three "model building codes" produced in the United States for use and adoption as a baseline building code for states and local municipalities. The process by which ICBO produces the "Uniform Building Code" was first examined and then several users of the code were examined to determine if ICBO produces this model code in sufficient quantity. The users examined were all from the State of California. Based on the analysis of this thesis, it was determined that ICBO does produce the "Uniform Building Code" in sufficient quantity to its users. Also included is an examination of the Naval Facilities Engineering Command (NAVFACENGCOM) and how it regulates design and construction for Navy projects. Recommendations include studying whether the NAVFACENGCOM should adopt the "model

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL Paul M. Carrick	22b TELEPHONE (Include Area Code) (408) 646-2939	22c OFFICE SYMBOL Code 54CA

DD Form 1473, JUN 86 Previous editions are obsolete SECURITY CLASSIFICATION OF THIS PAGE

S/N 0102-LF-014-6603 Unclassified

T245571

Block 18. Subject Terms continued:
State Building Codes, Model Building Codes

Block 19. Abstract continued:
building codes" as a baseline for the "Navy's Building Code."

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ANALYSIS OF THE *UNIFORM BUILDING CODE*

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MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
December 1989

Thesis
N24583
C.1

ABSTRACT

This thesis examined and analyzed the International Conference of Building Officials (ICBO) who produces a public good, the *Uniform Building Code*. The *Uniform Building Code* is one of the three "model building codes" produced in the United States for use and adoption as a baseline building code for states and local municipalities. The process by which ICBO produces the *Uniform Building Code* was first examined and then several users of the code were examined to determine if ICBO produces this model code in sufficient quantity. The users examined were all from the State of California. Based on the analysis of this thesis, it was determined that ICBO does produce the *Uniform Building Code* in sufficient quantity to its users. Also included is an examination of the Naval Facilities Engineering Command (NAVFACENGCOM) and how it regulates design and construction for Navy projects. Recommendations include studying whether the NAVFACENGCOM should adopt the "model building codes" as a baseline for the "Navy's Building Code."

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I. INTRODUCTION

A. GENERAL

This thesis was undertaken to determine if a private organization is producing a public good in sufficient quantity for state and local municipal use, and whether this private organization could also produce this public good in sufficient quantity for use at the federal level, specifically the Naval Facilities Engineering Command (NAVFACENGCOM). The private organization this thesis will examine is the International Conference of Building Officials (ICBO) which produces the *Uniform Building Code.*

Economic theory defines a public good as:

> There are some goods that either will not be supplied by the market or, if supplied, will be supplied in insufficient quantity. An example on a large scale is national defense; on a small scale, navigational aids (such as a buoy). These are called pure public goods. They have two critical properties: first, it does not cost anything for an additional individual to enjoy the benefits of the public good. Formally, there is a zero marginal cost for the additional individual enjoying the good...Secondly, it is, in general, difficult or impossible to exclude individuals from the enjoyment of the public good. [Ref 1:pp. 74-75]

This thesis will examine based on the above theory, whether ICBO is producing a public good in the form of the *Uniform Building Code* in sufficient quantity to its users (i.e., state, local municipalities, construction industry and private citizens) and whether this good could also be used by federal agencies.

Construction in the United States is regulated to ensure the protection of life and property for individuals that own, use or in anyway may be affected by the facility. All construction in the United States is regulated through some type of a building code, either at the federal level or the state/local municipal level. A building code is a culmination of regulations that have evolved over the years to regulate construction products and procedures. A building code is defined as:

> A legal document which sets forth requirements to protect the public health, safety, and general welfare as they relate to the construction and occupancy of buildings and structures. In doing so, codes generally set forth requirements for exits, fire protection, structural design, sanitary facilities, light and ventilation, environmental control, materials, and energy conservation. [Ref 2: p. 5]

It is noted that the primary considerations of a building code are the health, safety and general welfare of the public; and economic considerations are not included in the definition.

> Building codes and standards continually remind us of the high priority that must be assigned to safety. Aesthetics, productivity, marketability, and other [economic] factors may loom as major considerations, but all of them rank below safety as a priority for occupants and their neighbors. [Ref 3:p. 1]

Requirements for buildings vary depending on geographic regions due to differences in climatic and geological conditions. The requirements within building codes are a compilation of standards often provided by standard writing organizations such as the American Society for Testing and Materials (ASTM) and the American Concrete Institute (ACI). Standards are basically established for the purpose of defining methods of design, fabrication, or construction, and specifying accepted design procedures, establishing quality requirements and physical properties of materials or manufactured products; and judging structural capabilities, durability, quality, and fire protection capability [Ref 4:p. 30].

> All sectors of the construction community benefit from building codes and related standards. They provide the basis of communication among the architect, contractor, suppliers, and building official. Even in the restricted situation where the building designer is associated with the constructor and the facility is not regulated, use of a building code will provide a basis for design validation and comparison with other facilities. Conformance to certain standards can favorably influence insurance costs. When a building owner is confident that his newest facility meets applicable standards, communication with potential users and insurers is more reliable and authentic. [Ref 3:p. 1]

In the United States, state and local municipalities have the responsibility of developing and enforcing building codes within its jurisdictions. Agencies for the federal government, such as the Department of Defense (DOD), regulate construction for their facilities through specific design and construction criteria established by each agency. Each of these federal agencies also perform the enforcement (i.e., inspection) of its construction criteria. In the past and currently, federal agencies construct federal facilities autonomous to state and local municipal building codes and enforcement.

While performing research for this thesis, a recently enacted federal law, United States Code 101-678, of 17 November 1988, which amends the Public Buildings Act (40 U.S.C 601-616) of 1959 was discovered. It could affect the way federal agencies construct facilities. This law mandates that all federal agencies comply with local building codes, and gives local officials the authority to review and comment on the construction of federal facilities at the discretion of the head of the federal agency [Ref 5]. No evidence was found that this law has affected the way federal agencies construct facilities, nor has there been any increase in state and local municipal involvement in the construction of federal facilities. A detailed discussion of this law is included throughout the text of the thesis.

B. BACKGROUND

Most municipalities adopt or base their building code on one of the three "model building codes" produced by a model code-writing organization in the United States. The three "model building codes" are produced by the International Conference of Building Officials (ICBO), Building Officials and Code Administrators (BOCA) International, Inc., and the Southern Building Code Congress International (SBCCI). ICBO's codes have been primarily adopted in the western United States, BOCA codes have been primarily adopted in the northeast United States, and SBCCI have been primarily adopted in the southeast United States. The three model code organizations are under an umbrella organization called the Council of American Building Officials (CABO) which was created to establish a communications channel for building officials and congressional, federal and industry organizations. One of the primary functions of CABO is to consolidate the efforts of ICBO, BOCA, and SBCCI on matters of mutual concern [Ref 2:p. 23].

Once a "model building code" has been approved at the state level or passed by local municipal ordinance, it then becomes a *Building Code* and therefore a state or local municipal law. Details on the process by which a "model building code" becomes law are discussed in Chapter 3. These private organizations are thus providing a public good in the form of a building code when its "model building code" is adopted by a state and/or local municipality. Federal agencies, such as the DOD, base their design and construction criteria (i.e., building code) on a combination of all three model codes and past experience [Ref 6].

This thesis will focus only on ICBO which produces the *Uniform Building Code*. The primary objective of the *Uniform Building Code* is:

> The purpose of the building code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures within a jurisdiction and certain equipment specifically regulated therein. [Ref 7:p. 1]

An examination of ICBO's primary objective shows that it parallels that of the definition of a building code indicated earlier in this Chapter. Here again, the philosophy primarily emphasizes safety, health and welfare of the general public and there is no mention of economic factors when considering the building code.

Parts of the *Uniform Building Code* reference the *Uniform Building Code Standards* which are adopted from standards published by standard writing organizations, such as ASTM and

ACI. There are eleven parts consisting of 60 chapters and an appendix which supplements some of the chapters contained in the *Uniform Building Code*:

1. Part I - Administrative Requirements.
2. Part II - Definitions and Abbreviation.
3. Part III - Requirements for Seven Basic Types of Occupancies.
4. Part IV - Requirements Based on Types of Construction.
5. Part V - Engineering Regulations for Quality and Design of the Materials of Construction.
6. Part VI - Lists detailed regulations for excavations, foundations, and retaining walls, veneer, roof construction and covering, exits, skylights, sound transmission control, penthouses and roof structures, masonry or concrete chimneys, fireplaces and barbecues, fire extinguishing systems, stages and platforms, and motion picture projection rooms.
7. Part VII - Fire resistive standard for Fire Protection.
8. Part VIII - Requirements for Public Streets and Projections over Public Property.
9. Part IX - Requirements for Walls and Ceiling Covering.
10. Part X - Addresses special projects, specifically cellulose nitrate, prefabricated construction, elevators, dumbwaiters, escalators and moving walks, light-transmitting plastics, glues, and glazing.
11. Part XI - *Uniform Building Code Standards* referenced in the code by title and source.
12. Appendix - Gives life safety requirements for existing high rise buildings and existing buildings other than high rise buildings. It also addresses covered mall buildings, aviation control towers, agricultural buildings, alternate snow load designs, earthquake recording instrumentation, re-roofing, sound

> transmission control, basement pipe inlets, patio covers, elevators, dumbwaiters, escalators, and moving walks, energy conservation in new building construction, regulations governing fallout shelters, and excavation and grading. [Ref 4]

The distinction between codes and standards must be made to correctly evaluate the code development process.

> Building codes and standards have very similar but separate functions. In simple terms, it can be stated that a building code is a document that typically contains "where required" type provisions while a standard used in a building code is a document that contains 'how to' type provisions. Both are necessary to completely define a requirement. [Ref 4:p. 31]

Federal, state and local governments and individuals involved in code writing and revisions represent the views of industry, and consumers who contribute their time and expertise to the technical process. This thesis will examine the dynamic process involving constant interaction between the public and private sectors of the construction industry in the formulation and adoption of the *Uniform Building Code*.

C. METHODOLOGY

This thesis was conducted using archival and opinion research to determine who uses the model code, to what extent it is being used, and whether it is satisfying their needs. Interviews included the producer of the "model building code," specifically the ICBO, and the users of the code. The users of the code that were interviewed included:

1. A large and a small municipality that have adopted and the code.

2. Architect-Engineering firms that must abide by the code in producing designs.

3. Construction contractors that must abide by the code in constructing building.

4. A federal agency, specifically, the Naval Facilities Engineering Command, Western Division who is increasingly affected by local building codes.

This thesis focused on answering the following questions:

1. How does ICBO develop the *Uniform Building Code*?

2. Who uses the *Uniform Building Code*?

3. How do municipalities adopt the *Uniform Building Code*?

4. Is the *Uniform Building Code* sufficiently meeting the needs of those using the code?

5. Can the federal government use the *Uniform Building Code*?

D. SCOPE AND LIMITATIONS

As stated earlier, there are three model code-writing organizations which produce "model building codes." There are also several other organizations such as the International Association of Plumbing and Mechanical Officials (IAMPO), Western Fire Chiefs Association (WFCA) and the National Fire Protection Association that produce codes related to the construction industry, e.g., the *National Electric Code* and the *National Fire Code*.

The scope of this thesis is limited to examining and analyzing ICBO's code development and revision process. Also, ICBO publishes several other model codes, such as the *Uniform Sign Code* and the *Uniform Mechanical Code*. This thesis will only examine and analyze ICBO's *Uniform Building Code* development and revision process.

Interviews of state and city government agencies and industry users of the *Uniform Building Code* were limited to users within the State of California. Interviews of representatives of a federal agency affected by the adoption of the *Uniform Building Code* were limited to the Naval Facilities Engineering Command.

It should be noted that the recommendations and conclusions of this thesis are drawn based on this limited sample only. This sample is not a statistical representation of the population of users of the *Uniform Building Code*. Because of the scope of this thesis, the sample is only an indication of how sufficient the public good is supplied.

To determine whether ICBO is producing a public good in sufficient quantity, this thesis will first examine how ICBO is organized and then the process by which ICBO produces the *Uniform Building Code*.

II. INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS

A. INTRODUCTION

The International Conference of Building Officials (ICBO) is a nonprofit organization headquartered in Whittier, CA, that represents building officials and the construction industry in the western states of the United States (See Figure 1).

APPROXIMATE AREAS OF MODEL CODE INFLUENCE

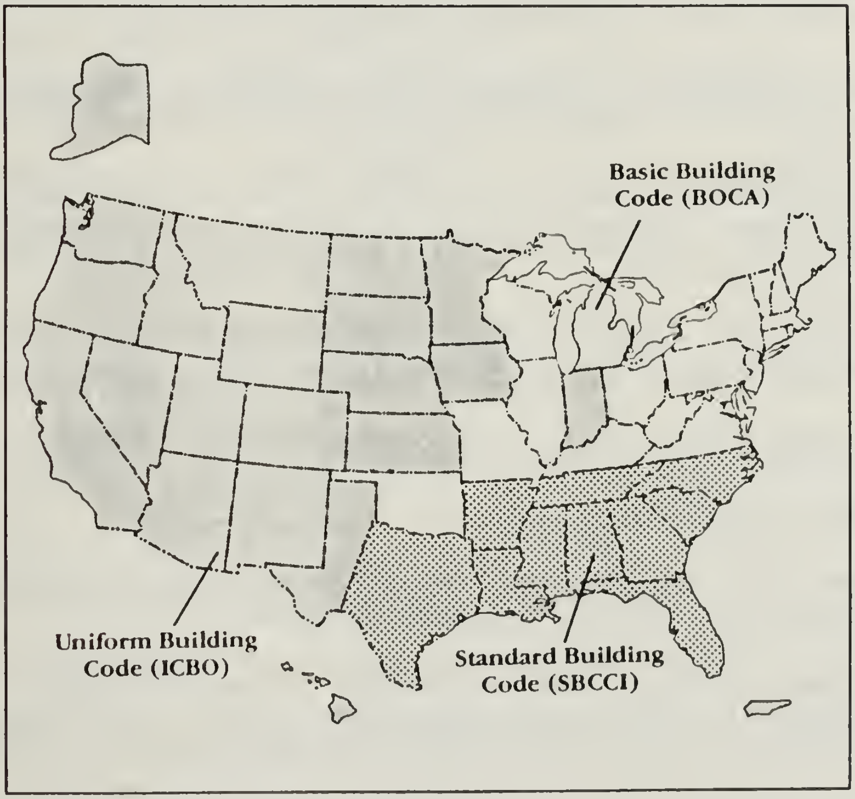
Basic Building Code (BOCA)
Uniform Building Code (ICBO)
Standard Building Code (SBCCI)

Figure 1

The objectives of the conference are:

1. To investigate and promote the principles behind safety in the construction, occupancy, and location of buildings and structures.

2. To research, develop, recommend, and promote uniform regulations, legislation and enforcement related to all phases of building construction.

3. To develop, maintain, and promote the adoption of the *Uniform Building Code* and other uniform codes and related documents which are designed to enhance uniformity in regulations for the construction, alteration, conservation, maintenance, preservation, or repair of buildings and structure, and equipment and fixtures in any of the foregoing, to the extent regulation of any said matters is considered desireable.

4. To advise and assist in the administration of building laws and ordinances, the development of management and enforcement programs and activities.

5. To research, develop, and publish materials about uniform building construction procedures and practices.

6. To advance the professional skills of those in the business of the administration and enforcement of building laws.

7. To do all other things incidental or desirable to the achievement of the above objectives. [Ref 8:p. 332]

In consonance with these objectives, ICBO provides the following services:

1. The publication and revision of the *Uniform Building Code* and its related publications.

2. Investigation and research of principles underlying safety to life and property in the construction, use and location of buildings and related structures.

3. Development and promulgation of uniformity in regulations pertaining to building construction.

4. Education of building officials.

5. Formulation of guidelines for the administration of building inspection departments. [Ref 8:p. 12]

ICBO was founded in 1922 to develop a building code that could be adopted and enforced by local municipalities. The first ICBO building code, titled the *Uniform Building Code*, was published in 1927. The *Uniform Building Code* has since been adopted by municipalities in 21 of the western United States and has also been adopted in several foreign countries [Ref 8:p.12]. "The *Uniform Building Code* is the state code of El Salvador, and served as a basis for the national codes of Japan and Brazil." [Ref 8:p. 12]

The federal and state governments in the United States have delegated the responsibility to each municipality to either adopt or create its own building codes under its jurisdiction. As an example, the state of California has mandated that all local municipalities adopt the *Uniform Building Code* as their building code for all residential construction (See Appendix A) [Ref 9][Ref 10][Ref 11][Ref 12].

Local municipalities as well as the state government in California may amend the *Uniform Building Code* to meet local requirements. The number of amendments made by the State of California and local municipalities to the *Uniform Building Code* will be discussed in later chapters. A copy of the amendment made by municipal governments must be forwarded to the State of California, Department of Housing and Community Development, Division of Codes and Standards [Ref 9][Ref 10][Ref 13]. No action is taken by the state of California on these amendments. They are filed with the state for record purposes only [Ref 12][Ref 13][Ref 14]. Further detail of the State of California's process of adoption and use of the *Uniform Building Code* will be discussed in Chapter III.

ICBO is a self sustaining organization which derives its revenues primarily from the sale of its publications and services to the private and municipal sectors, and partially from annual membership fees. ICBO has assets of over nine million dollars and receives revenues of approximately eight million dollars per year. ICBO has no other sources of revenues. ICBO does not receive any contributions from the government nor the private sector. ICBO stated this allows them to remain independent of outside influence in establishing their model codes [Ref 15].

The area ICBO serves is divided into three geographical districts as shown in Figure 2. These districts divide the United States into approximately three equal areas designated as the Northern, Central, and Southern districts. Although all the states shown are not actual members of ICBO, all states are potential ICBO members, since membership is

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS DISTRICTS

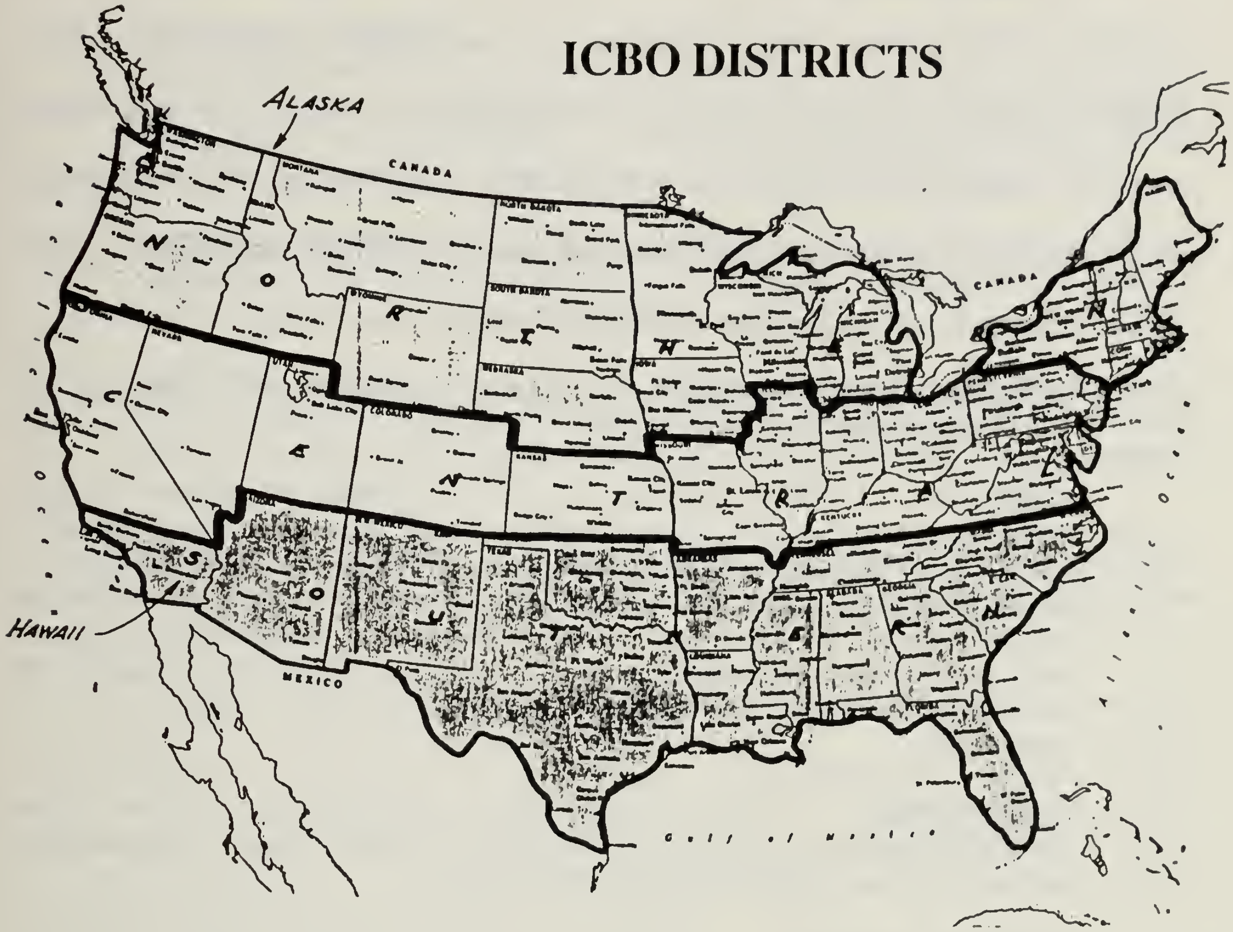

Figure 2

competed for by the three model code writing organizations. These districts provide a basis for equal representation of geographical regions on voting committees.

B. ORGANIZATION

1. Membership

There are nine classes of membership in ICBO. All membership is subject to the classification by and approval of the Board of Directors of ICBO. The Board of Directors will be discussed in more detail later in this chapter. The nine classes of membership are:

1. **GOVERNMENTAL MEMBERS.** There are two classes of governmental membership.

   CLASS A. A governmental unit or agency engaged in the administration or formulation of laws and ordinances relating to building construction. In no case shall a governmental unit be entitled to more than one Class A membership, except as it has separate agencies engaged in the above activities, in which case the Board of Directors may classify such separate agencies as members.

   INDIVIDUAL. An individual responsible for the enforcement or administration of laws and ordinances relating to building construction.

2. **CHAPTER MEMBER.** An association or group of Class A member designees or others engaged in the administration or formulation of laws and ordinances relating to building construction, together with any associated interests, who subscribe to the objectives of the Conference.

3. **PROFESSIONAL MEMBER.** An individual or firm, incorporated or unincorporated, engaged in the practice of architecture, engineering, inspection, research, or testing.

4. **ASSOCIATE MEMBER.** A firm or corporation interested in the objectives of the Conference.

5. **SUBSCRIBING MEMBER.** An association or group of firms or corporations interested in the objectives of the Conference.

6. **HONORARY MEMBER.** An individual who has rendered outstanding and meritorious services in the furtherance of the objectives of the Conferences, and who shall be proposed by the Board of Directors and confirmed by a majority vote at the Annual Business Meeting.

7. **STUDENT MEMBER.** Any individual enrolled in classes or a course of study occupying at least twelve (12) hours of classroom instruction per week.

8. **RETIRED MEMBER.** Any former designated representative of a Class A member, any former representative of any other membership class or any former individual member who is retired.

9. **CERTIFIED MEMBER.** An individual who maintains a current certificate under at least one of ICBO's certification programs. [Ref 16]

Only Class A member designees may vote on any matter of business assigned by the Board of Directors. Each Class A member is entitled to only one vote, regardless of the size of the governmental unit or agency.

There are over 2,000 Class A members each paying an annual fee of $70.00 or $140.00 (if population is less than 10,000, fee is $70.00, if population is greater than 10,000, fee is $140.00), 350 Individual members with an annual fee of $55.00, 230 Certified members with an annual fee of $25.00 (additional $110.00 with ICBO Evaluation Service, Inc., reports), 3,250 Professional members with an annual fee of $55.00 (additional $110.00 with ICBO Evaluation Service, Inc., reports), 240 Associate members with an annual fee of $200.00, 80 Subscribing members with an annual fee of $400.00, 40 Retired members with an annual fee of $12.00, 50 Honorary members (no fee), and 390 Student members with an annual fee of $18.00 [Ref 8]. All members are kept up to date on vital issues which impact their work through a flow of information maintained by the distribution of periodicals (e.g., *Building Standards*) and newsletters [Ref 17]. It should be noted that ICBO does not maintain data on the magnitude of its potential Class A members. ICBO stated that estimating the potential number of Class A members in California would be very difficult and time consuming, since it would require reviewing all county and city governments in California to determine which agencies are involved in building ordinances (e.g., Building Department, Fire Department, Health Department) and then determine whether the agency would be considered a separate unit as defined by its bylaws. A Class A member is a governmental unit or agency that is involved with building ordinances. This allows municipalities to have more than one Class A member, depending on how the municipality has divided the responsibilities for the development and enforcement of building ordinances.

2. Officers

The officers of ICBO are the Immediate Past Chairman, Chairman, First Vice-Chairman, Second Vice-Chairman, President, Vice-President, Secretary, Treasurer, and others assigned by the Board of Directors or President as needed.

The Immediate Past Chairman, Chairman, First Vice-Chairman, and Second Vice-Chairman are required to be Class A members voted into office by the Class A membership. Each of the four positions are rotated among the three geographic areas each election. For example, in 1988, the Chairman was the Director of Building Services from Springfield, Illinois (Central Division), First Vice-Chairman was the Director a Community Development, from Arlington, Texas (Southern District), the Second Vice-Chairman was the Building Official from Hillsboro, Oregon (Northern Division) and the Immediate Past Chairman was the Building Safety Director from Medford, Oregon (Northern Division). In 1989 the Chairman is from Hillsboro, Oregon (Northern Division), the First Vice-Chairman is from Pacifica, California (Central District), the Second Vice-Chairman is from Long Beach, California (Southern Division) and the Immediate Past Chairman is from Arlington, Texas (Southern Division). No individual may serve for more than one year as Chairman. [Ref 18]

The following is a comment by an ICBO official regarding the election of officers:

> The election of officers is a very political process since those who run for office tend to represent the interest of members in a particular city or geographical area. However the election of an individual is usually based on that individual's past performance in the Conference, such as involvement in committee work, and other Conference activities. Historically, there has not been a trend that shows that officers representing a particular geographic region have been from the same city. It also appears that small and large cities have been fairly represented. [Ref 19]

The President is appointed by the Board of Directors. The President is a full time administrator. He is the general manager and Chief Executive Officer responsible for the daily operations of ICBO subject to the control of the Board of Directors. The President has the authority to appoint the remaining officers and staff of ICBO. There is no maximum term length for the president.

3. Board of Directors

The Board of Directors consists of sixteen persons, four of which are ex officio voting members (the Immediate Past Chairman, the Chairman, the First Vice-Chairmen and the Second Vice-Chairman), and the remaining twelve are elected by the Class A membership. Each director must be a Class A member, with a term of three years, not to exceed two consecutive terms. The twelve elected directors are equally distributed between the three geographic regions of ICBO.

The following is a comment made by an ICBO official regarding the Board of Directors:

> Directors are elected on the basis of their past involvement in the code development process. The Directors historically have been from various cities in terms of size and location, and although there is no written bylaw prohibiting it, they have not been repeatedly from the same cities. No trends have existed which show that members of any one city are being elected as a Director more frequently than any other city. [Ref 19]

Election for Directors are conducted so that no geographic district can or will have more than two elected Directors with terms expiring at the same time. Directors are elected by a majority vote of those voting[1] at the Annual Business Meeting. [Ref 8:p. 344] The Board of Directors reviews and approves membership on as-needed basis when interpretation of a new applicants membership class designation is needed, e.g., Class A Governmental Member or Individual Governmental Member.

They may also enter into joint publication of codes with other organizations, and sponsor or support model codes developed by any organization. Examples of joint publications approved by ICBO's Board of Directors include: the *Uniform Fire Code,* jointly published with the Western Fire Chiefs Association (WFCA); and the *Uniform Plumbing Code* and *Uniform*

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[1] Voting members refers to Class A members.

Mechanical Code, jointly published with the International Association of Plumbing and Mechanical Officials (IAPMO).

4. Committees

Code Development Committees are established by the Board of Directors. There are six standing code development committees: 1) Fire and Life Safety; 2) General Design; 3) Lateral Design; 4) Administrative; 5) Fire Risk Assessment; and 6) Mechanical [Ref 17:p. 17]. The Board of Directors may also establish special code development committees as required. Each committee consists of at least three voting (Class A) members, or any multiple of three voting members. "The voting members of the committees are chosen for their experience and expertise in the fire and life safety, general design, seismology, administrative, and mechanical fields." [Ref 8:p. 21]

The number of members in each committee is determined by the scope of activity in the building industry in that particular area of expertise. For example, the number of members on a committee set up for Glazing Codes may be three, whereas the committee for Fire and Life Safety may have six members. The committees are also open to any non-voting members from the professions and industry that may have an interest in the objectives of the committees and are willing to lend their expertise to committee deliberations. Service as a non-voting member is strictly on a voluntary basis.[2] [Ref 19]

The chairman and members of each committee are appointed by the Board of Directors. Any Class A member interested in serving on a Code Development Committee submits an application to the Credentials Committee. The Credentials Committee reviews the applications, interviews the applicant and makes a recommendation on the basis of the applicant's experience and qualifications in the area of expertise required by the position being applied for in the Code Development Committee. The Board of Directors then makes the final decision in the selection of the voting members. Each voting member serves on a committee for no more than one year. The voting membership of each committee is equally distributed among the geographical districts of ICBO. [Ref 16][Ref 19]

The following is a comment from an ICBO official concerning the Code Development Committees:

> The Board makes it a point to select members from different cities within the respective geographic regions. However, in some areas of code development, some cities may have greater representation than others. This is due to a specific expertise in a field which developed through the resources and experience available in larger cities or because its geographic area rendered more exposure to

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[2] These selection and voting procedures used by ICBO are discussed and analyzed in Chapter V.

those types of problems. In such cases, members may be selected from the same cities within three to four years. However, this does not occur frequently. [Ref 19]

Each Code Development Committee receives or initiates code changes for review, study, and investigation. Upon completion of this review, which includes a public hearing, the committee reports on the proposal with a recommendation of either approving, approving as revised, requiring further study, or disapproving the change.

There is a Code Coordinating Committee which consists of the chairmen of each Code Development Committee. The chairman of this committee is appointed by the Board of Directors. The function of this committee is to coordinate the code development committee activities to eliminate conflicts and unnecessary duplication of effort.

5. Chapters

The Conference encourages the establishment of regional state and local chapters which further the objectives of ICBO on the regional, state, and local levels. There are currently over 70 district and state chapters of ICBO which have been chartered to give members an opportunity to meet monthly on a regional basis to promulgate uniformity in code interpretation and enforcement [Ref 9][Ref 17]. Smaller cities use chapters as a vehicle for mutual support on code interpretation and enforcement [Ref 9].

C. CODE DEVELOPMENT AND REVISION PROCESS

Proposed additions and revisions to any part of the *Uniform Building Code* may be submitted by any concerned party, except ICBO staff members. Individuals proposing a change are not required to be a member of ICBO. Figure 3 illustrates the process by which a proposed change to the *Uniform Building Code* is reviewed and decided upon by ICBO. Changes to the code are made on an annual basis with a revised *Uniform Building Code* actually published every three years. Figure 4 shows a timetable which is followed to complete the code development process. Changes are adopted through a consensus process which will be described later. The following will now discuss in detail the change process to the code.

The *Uniform Building Code* is widely used by municipalities throughout the western states as stated earlier. All users of the code are welcome to propose changes. All proposed changes will be reviewed through the formal code revision process. Only the individual that submitted the proposed change may withdrawal the proposed change.

A deadline for filing code revisions is established each year by the Board of Directors and is published in ICBO's magazine, *Building Standards*, which is circulated among its members. The deadline for revisions is normally set on or

ICBO CODE CHANGE PROCESS

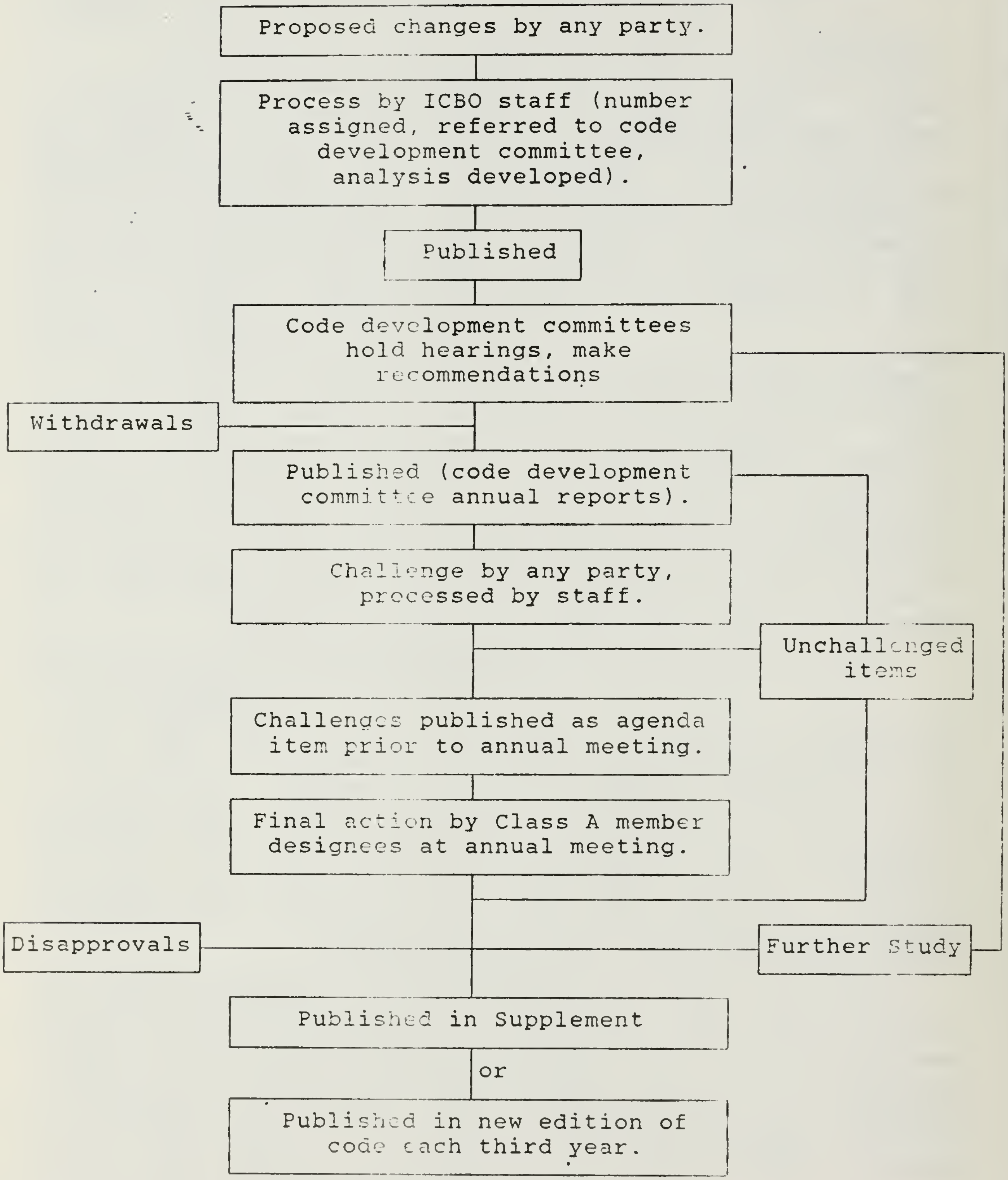
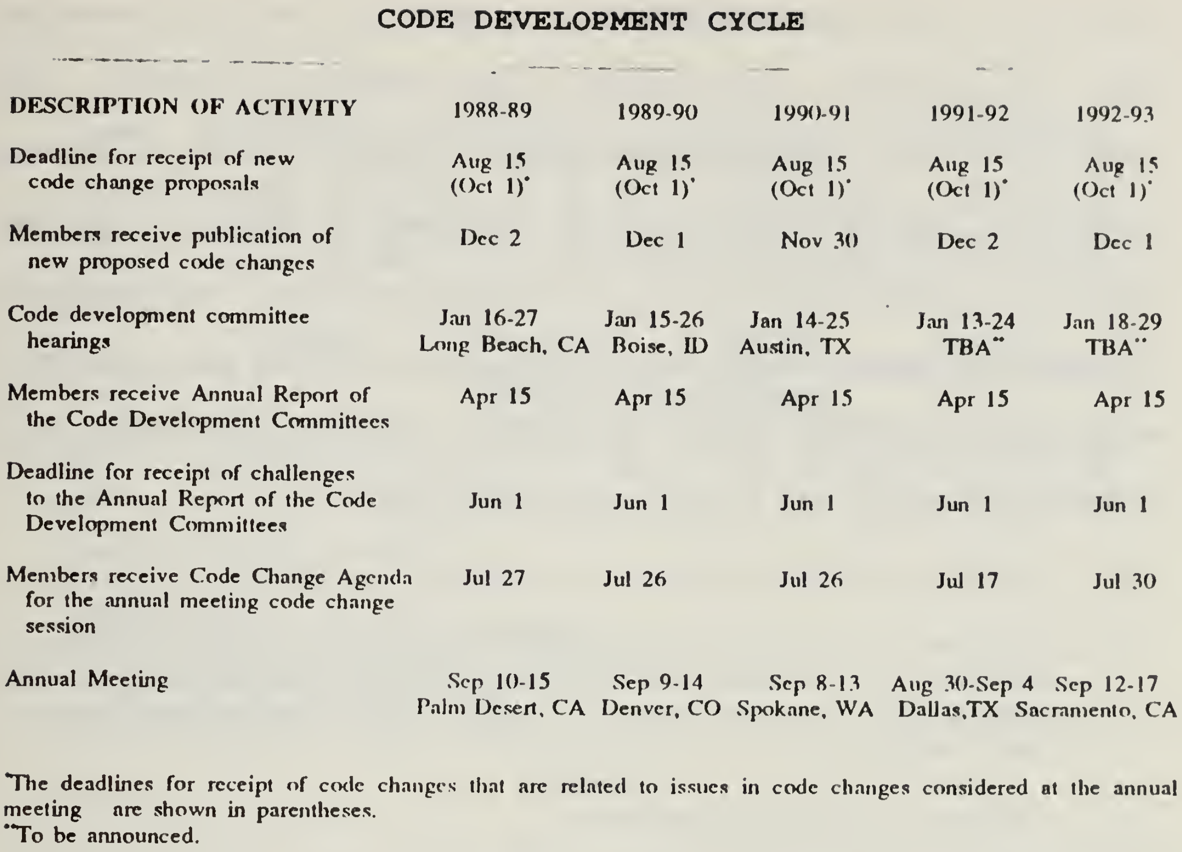

Proposed changes by any party.
Process by ICBO staff (number assigned, referred to code development committee, analysis developed).
Published
Code development committees hold hearings, make recommendations
Withdrawals
Published (code development committee annual reports).
Challenge by any party, processed by staff.
Unchallenged items
Challenges published as agenda item prior to annual meeting.
Final action by Class A member designees at annual meeting.
Disapprovals
Further Study
Published in Supplement
or
Published in new edition of code each third year.

Figure 3



CODE DEVELOPMENT CYCLE

DESCRIPTION OF ACTIVITY	1988-89	1989-90	1990-91	1991-92	1992-93
Deadline for receipt of new code change proposals	Aug 15 (Oct 1)*	Aug 15 (Oct 1)*	Aug 15 (Oct 1)*	Aug 15 (Oct 1)*	Aug 15 (Oct 1)*
Members receive publication of new proposed code changes	Dec 2	Dec 1	Nov 30	Dec 2	Dec 1
Code development committee hearings	Jan 16-27 Long Beach, CA	Jan 15-26 Boise, ID	Jan 14-25 Austin, TX	Jan 13-24 TBA**	Jan 18-29 TBA**
Members receive Annual Report of the Code Development Committees	Apr 15	Apr 15	Apr 15	Apr 15	Apr 15
Deadline for receipt of challenges to the Annual Report of the Code Development Committees	Jun 1	Jun 1	Jun 1	Jun 1	Jun 1
Members receive Code Change Agenda for the annual meeting code change session	Jul 27	Jul 26	Jul 26	Jul 17	Jul 30
Annual Meeting	Sep 10-15 Palm Desert, CA	Sep 9-14 Denver, CO	Sep 8-13 Spokane, WA	Aug 30-Sep 4 Dallas,TX	Sep 12-17 Sacramento, CA

*The deadlines for receipt of code changes that are related to issues in code changes considered at the annual meeting are shown in parentheses.
**To be announced.

Figure 4

about 15 August. Changes are proposed by any concerned party in industry or government within the format prescribed by ICBO. These proposals are submitted to ICBO's headquarters in Whittier, California for review and comment by staff engineers. Any proposal that does not make this deadline are held over until the following year's change process. It takes approximately 12 months for a code change to run the course of the code change process [Ref 17:p. 16].

Proposals are submitted with ICBO's Code Change Submittal form. This form is of benefit to the proponent of the change since it allows the proponent to submit as much persuasive data as possible to support the proposed change. No supporting data is required to be submitted with a change proposal. A life cycle cost or cost benefit analysis is not required to be submitted with a proposed change. Few proposed changes are submitted using life cycle cost or cost benefit analysis techniques [Ref 15][Ref 20]. Proposed changes may fall into one of the following categories:

1. Changes involving English and Metric Units.
2. Changes to standards linked to ICBO. When a special subject is not covered by a national standard and regulation is needed, an ICBO U.B.C standard may be developed.
3. Changes to test standards.
4. Changes in material standards.
5. Changes in construction specifications and design standards.
6. Changes to special equipment or material installation standards.

The number of proposed code changes to the *Uniform Building Code* and the actions taken by the Code Development Committees from 1964 through 1987 are shown in Figure 5. There is a notable trend for dramatic increases in the number of change proposals in the year before a new code edition is published. Although the figures do not indicate the action taken by the members at the Annual Business Meetings, the

COMMITTEE RECOMMENDATION

	1964 Edition				1967 Edition				1970 Edition				1973 Edition			
Action	1964	1965	1966	Total	1967	1968	1969	Total	1970	1971	1972	Total	1973[4]	1974	1975	Total
NUMBER OF CODE CHANGES																
A or AR[1]	14	109	174	297	42	74	345	461	15	122	321	458	7	115	205	327
D[2]	38	138	141	317	66	70	277	413	36	104	242	382	28	94	194	316
FS[3]	85	111	26	222	53	189	18	260	145	306	67	518	262	187	103	552
Total	137	358	341	836	161	333	640	1134	196	532	630	1358	297	396	502	1195

	1976 Edition				1979 Edition				1982 Edition				1985 Edition			
Action	1976	1977	1978	Total	1979	1980	1981	Total	1982[5]	1983	1984	Total	1985[6]	1986	1987	Total
NUMBER OF CODE CHANGES																
A or AR[1]	45	113	225	383	24	35	222	281	42	112	224	378	125	140	208	473
D[2]	62	88	152	302	52	166	169	387	35	57	183	275	131	178	210	519
FS[3]	206	227	84	517	83	51	38	172	36	72	34	142	10	8	4	22
Total	313	428	461	1202	159	252	429	840	113	241	441	795	266	326	422	1014

[1] Approval or Approval as Revised.

[2] Disapproval.

[3] Further Study.

[4] In 1973, the challenge procedure was established.

[5] In 1982, Code Development Committees were established. Before 1982, subcommittees reported to the Code Changes Committee, which in turn reported to the membership.

[6] In 1985, the 12-month code change cycle was established.

Figure 5

numbers shown are a very close indication of the membership action [Ref 17:p. 16]. Those items that are carried over for further study have no time limit before further action is taken.

When proposals are received by ICBO, staff members develop an analysis of the proposal and eventually assign the proposals to the cognizant Code Development Committee. The nature of this analysis is to raise questions that may be of concern during the subsequent review of the proposal by the Code Development Committee. Approximately 1.5 manhours are spent on the average analysis.

Each proposed change, along with the corresponding staff analysis, is then published in ICBO's semi-monthly magazine, *Building Standards, Part III*, which is distributed to all ICBO members and subscribers of the magazine. The date and place for hearings before Code Development Committees are published along with the proposed code changes in *Building Standards, Part III*. Code Development Committee hearings are normally held approximately 45 days after publication and typically last from one to two weeks, depending upon the number of code changes to be considered [Ref 17:p. 18]. The Code Development Committee hearings are rotated throughout the geographic districts in the United States. These hearings provide a forum for any person to challenge or comment on the proposed changes, prior to the Code Development Committees' recommended decision. "These public hearings allow for the free exchange of views leading to changes that are responsive to the concerns of the construction industry, design professionals, and building officials." [Ref 8:p. 21]

Typical attendance of ICBO members[3] at Code Development Committees hearings are: Fire and Life Code Committee session -- 150 members; General Design session -- 100 members;

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[3] These attendance figures represent approximate totals of all ICBO members (voting and non-voting) attending Code Development Committee hearings.

Mechanical session -- 100 members; and Seismology session -- 75 members. Approximately one-fourth of these members are voting members. [Ref 19]

Agendas for committee hearings are primarily made up of the published proposed code changes in *Building Standards, Part III.*

> Frequently the agendas of code development committees are very crowded, and the average time allotted for consideration of item is often less than ten minutes. There are some items that are very lengthy, such as a chapter rewrite, and may take two or three hours of time, so that the committee has even less time to consider the other items. They therefore do not have the luxury of making extensive refinements to proposed code changes even though they may have merit. In addition, committee members need sufficient time to study amendments proposed during hearings, and there is a reluctance to make substantive changes when all of the interests that may be affected by the amendment have not been given notice or an opportunity to comment on the revised proposal. [Ref 17:p. 18]

The Code Development Committee may recommend either approving, approving as revised, requiring further study, or disapproving the change. All code development committee recommendations are based on a simple majority of voting members on the committee in attendance. For amendments that are recommended for approval, all voting members of the committee must be in attendance and vote.

The Code Development Committees' recommended decisions with their reasons are then published in ICBO's semi-monthly magazine, *Building Standards, Part IV.* This publication allows any person to review the decision of the Code Development Committees and challenge their decision. All recommendations of Code Development Committees not challenged are adopted by means of a general motion approved at the end of the Code Change Session at the ICBO Annual Business Meeting. The annual meeting will be described later in this chapter.

Challenges may be submitted by any person using the "Challenge to the Report of the Code Development Committees" form. The challenge must include reasons for the challenge and the action desired by the challenger (i.e., approval, approval as revised, disapproval, or further study). These challenges will then be placed on the agenda for discussion at the ICBO Annual Business Meeting.

The number of challenges that are typically considered are demonstrated by the 1987 figures by ICBO [Ref 19]. In 1987, of the 422 code change proposal received by ICBO, the Code Development Committees recommended 208 for approval or approval as revised, 210 for disapproval, and four for further study, Figure 5. Challenges were received on 151 of the Code Development Committees' recommendations, 38 of which the committees' recommendations were not sustained. Six of the 151 were recommended for further study. [Ref 19]

The Code Coordinating Committee establishes the date by which challenges must be submitted to ICBO headquarters prior to an annual meeting of all ICBO members. This annual meeting is called the Annual Business Meeting and is normally held in September or October of each year. The annual meeting is rotated throughout the geographic regions of the western United States. The Annual Business Meeting is usually five days in length, and allows all members of ICBO to gather to discuss such agenda items as: pertinent issues concerning ICBO, the election of Officers and Board of Directors, educational programs regarding current technology for edification of ICBO members and the Code Change Session.

The 1988 attendance of approximately 1,500 members typifies the extent of the participation at the Annual Business meetings. Approximately one-half of those attending are Class A members which represents approximately 40% of the total Class A membership, while the other half are special interest groups from the building industry. [Ref 19]

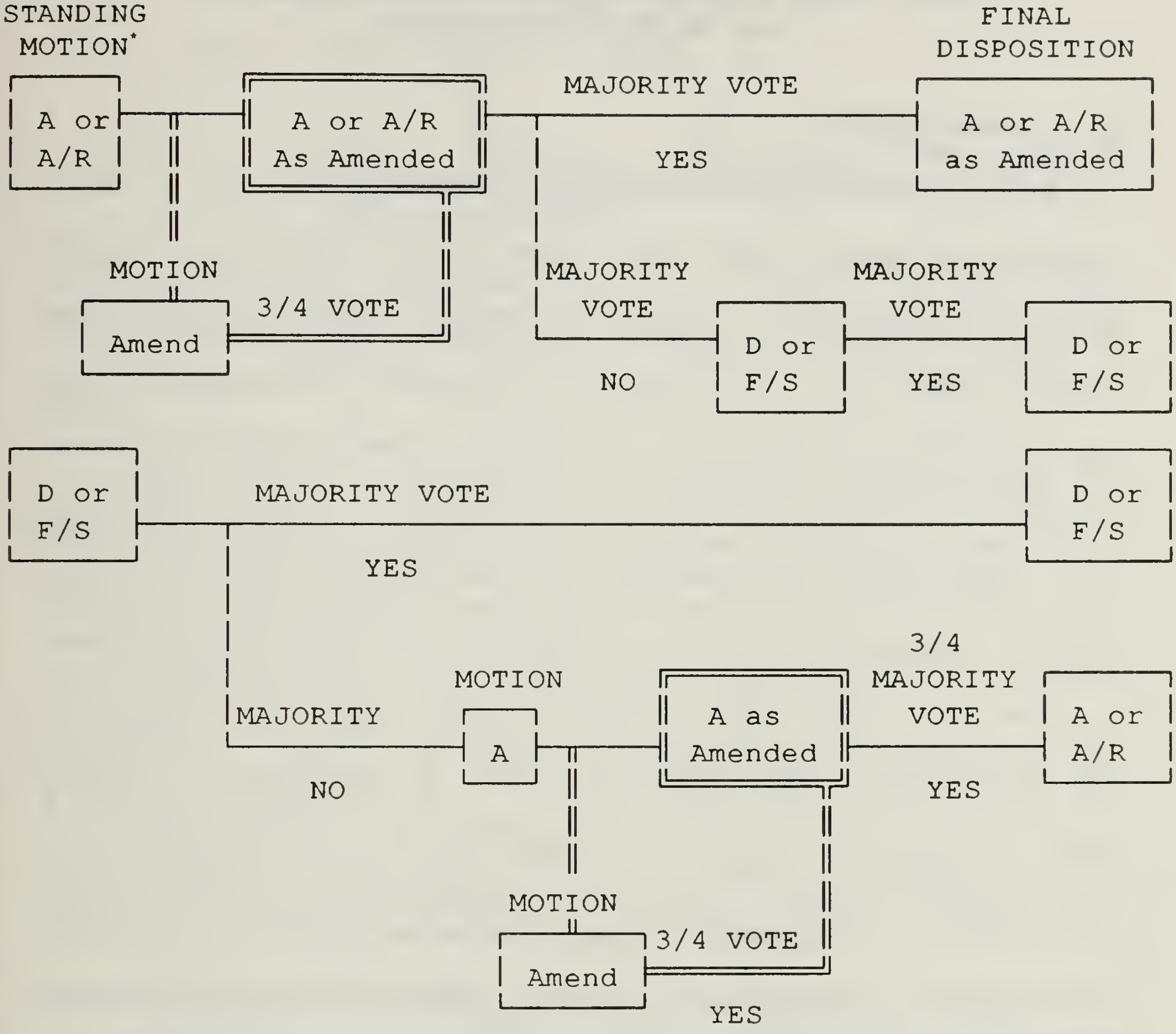
The Code Change Session is the final forum to review and vote on any proposed Code Development Committee recommendation that was challenged. Additional amendments to the challenged code change may be motioned at the Annual Business Meeting. The decision to sustain a committee recommendation, is based on a simple majority vote of the Class A members. The motion for amendments to the committees' recommendations require a three-fourths majority vote by the Class A membership to be approved. The vote(s) by the Class A membership is the final decision concerning any proposed code change. Figure 6 is a flow chart of the voting process at the Annual Business Meeting. Proponents of a change may resubmit a proposal as many times as desired for consideration by ICBO.

The annual changes are eventually incorporated into the *Uniform Building Code* which is revised and republished in the form of a new edition every three years by ICBO. In the two years between the publication of the new edition, all approved changes are published in *Supplements to the Uniform Building Code*.

This thesis will now examine the users of the *Uniform Building Code*, including municipal, state and federal government agencies. The examination will also include some of the industry users of the *Uniform Building Code* at each of these levels.

REQUIRED VOTE FOR THE MOST COMMON MOTIONS AT THE BUSINESS MEETING CODE CHANGES SESSION

[Ref 17:p. 28]



A is Approval
A/R is Approval as revised
D is Disapproval
F is Further Study

[*] This is the Code Development Committee recommendation. At the opening of the Code Changes Session at the meeting, a motion to adopt the recommendations of the Code Development Committees, as published within their annual report.

Figure 6

III. USE OF THE *UNIFORM BUILDING CODE* IN THE STATE OF CALIFORNIA

A. INTRODUCTION

Each state has its own building code and process by which changes are made to the code. This thesis focuses only on the State of California, and how it adopts, amends and enforces its building code. The State of California has mandated that the *Uniform Building Code*, published by ICBO, shall be applied to all occupancies throughout the State of California [Ref 11]. Additions and amendments to the *Uniform Building Code*, may be incorporated into the California *State Building Code*.

The California *State Building Code*, which is Title 24 of the California Administrative Code, is comprised of twelve parts. The twelve parts are comprised of the following:

1.	Part 1	Administrative Regulations of the State Building Standards Commission.
2.	Part 2	State Building Code (SBC) (References Uniform Building Code -- UBC).
3.	Part 3	State Electrical Code (SEC) (References National Electrical Code -- NEC).
4.	Part 4	State Mechanical Code (SMC) (References Uniform Mechanical Code -- UMC).
5.	Part 5	State Plumbing Code (SPC) (References Uniform Plumbing Code -- UPC).
6.	Part 6	Special Building Regulations (SBR).

7. Part 7 State Elevator Construction Code (SECC).

8. Part 8 State Historical Building Code (SHBC).

9. Parts 9 to 11 (Not Currently Used).

10. Part 12 State Reference Standards Code (SRSC). (References Uniform Building Code Standards -- UBC Standards)

This thesis will focus only Parts 1, 2 and 12 of this state code which references the *Uniform Building Code* published by ICBO.

There are 17 California State agencies responsible for writing, amending and adopting language for Parts 2 and 12 of Title 24 (*State Building Code*). These 17 agencies may also have responsibility for writing, amending and adopting language for other Parts within Title 24, e.g., State Electrical Code (Part 3), State Mechanical Code (Part 4). These agencies represent different types of interests in the building industry, such as, energy conservation, residential construction, fire safety, school construction and hospital construction. After adoption of an amendment by any of the 17 State Agencies, the amendment must then be approved by the California Building Standards Commission (CBSC) prior to becoming part of the *State Building Code*. The following sections will describe in detail the adoption agencies, the CBSC, and the adoption and approval process.

B. ORGANIZATION

1. The California Building Standards Commission

The *State Building Code* is reviewed, approved and published by the California Building Standards Commission (CBSC) which is within the State and Consumers Services Agency [Ref 21:sect. 18920]. A fact sheet about the CBSC, written by the commission is provided in Appendix D. This commission was created in 1980 by the California State Legislature to correct problems created by conflicting, duplicative and overlapping state regulations. The State of California has, "...over 20 agencies ranging from the Barbers' Licensing Board to the State Architect, adopt[ing] building standards and publish[ing] them in separate titles of the California Code of Regulations." [Ref 22:p. 1]

The goal of the CBSC is to provide a set of state building standards and administrative regulations for use by consumers and all members of the building industry. The impetus of this goal are:

1. To streamline the quantity of State regulations by eliminating unnecessary amendments and duplications.
2. Encourage State agency involvement in the model code adoption process.
3. Provide clear instruction to the user on when to use model code standards and when to use state amendments.

The CBSC is comprised of a Board of Commissioners and a permanent staff of currently seven individuals [Ref 23]. There are also councils and advisory panels established to assist the Commission in the performance of its duties.

a. Commissioners

The Board of Commissioners for the CBSC is comprised of the Secretary of the State and Consumers Services Agency, who is an ex-officio of the commission, and 10 commissioners appointed by the Governor subject to confirmation by the State Senate. The commissioners represent all interested parties in the building industry and its membership include the following:

1. An architect.
2. A mechanical, electrical, or fire protection engineer.
3. A structural engineer.
4. A licensed Contractor.
5. Three members from the general public.
6. A member of organized labor in the building trades.
7. A local building official.
8. A local fire official.

Any interested individual may apply for a seat on the Commission by writing to the State and Consumers Services Agency or directly to the Governor's Office. Applicants are screened by the Secretary of the State and Consumers Services

Agency on the basis of their expertise and experience. As stated by the Program Manager of the CBSC, "...many commissioners are appointed based on political considerations in addition to their expertise and experience." [Ref 23]

The chairman of the Commission is the Secretary of the State and Consumer Services Agency or the secretary's representative. The vice chairman is elected annually from among the Commission's membership. Each commissioner serves a term of 4 years in length and may be reappointed to the commission. The law does not state a maximum number of terms a commissioner may serve [Ref 21:sect. 18923]. The members serve on this commission without compensation except for actual necessary travel expenses [Ref 21:sect. 18924]. The makeup of the membership of the Commission is varied to assure fair representation of all constituencies is addressed, while also helping to ensure that the State's building code is succinct and up to date. The commissioners of the CBSC represent an independent commission that ensures that only the most necessary regulations are incorporated in the State's building code [Ref 22:p. 4].

The Commission meets an average of four times per year to consider proposed standards for approval, rejection or return the proposal to the adopting department for revision. These hearings are normally held in Sacramento, CA.

Once a proposal is approved by the Commission, it is published annually in a supplement to Title 24. Every three years, Title 24 is republished in its entirety. [Ref 23]

b. Executive Secretary and Coordinating Council

The commissioners appoint an Executive Secretary of the CBSC who holds office as required by the commission and is responsible for the overall daily operations of the commission. The executive secretary is also the chairman of the Coordinating Council with members appointed by the State Director of Health Services, the Director of the Office of Statewide Health Planning and Development, the Director of Housing and Community Development, the Director of Industrial Relations, the State Fire Marshal, the Executive Director of the State Energy Resources Conservation and Development Commission, and the Director of General Services. The Coordinating Council is responsible for the following:

1. Reviewing all proposed building standards and amendments submitted to the CBSC for approval to ensure the submittal meets required criteria (required criteria is discussed later in this chapter).

2. Drafting proposed building standards which the commission is authorized to adopt.
[Ref 21:sect. 18926]

The Coordinating Council meets on an as-needed basis to review proposed building standards and amendments.

The Coordinating Council does not meet in a public forum as is the case for the CBSC commissioners.

c. Advisory Panels

The commission may also establish advisory panels to review and advise the Commission on proposed building standards and amendments. There are normally three members on an advisory panel. The members of the advisory panels are appointed by the Board of Commissioners or the Executive Secretary. The advisory panels are normally comprised of members from the Board of Commissioners of the CBSC and the Coordinating Council. Infrequently, a member of an advisory panel is appointed from the building industry. Industry members are not compensated except for actual travel expenses. These advisory panels are established when a more detailed review is required by the commissioners prior to holding public hearings and rendering a decision.

Interested individuals can write to the CBSC Executive Secretary or to any commissioner to request consideration for membership on an advisory panel. Very few adopted amendments are reviewed by an advisory panel. Approximately one-percent of the adopted amendments are reviewed by an advisory panel [Ref 24].

2. Adopting Agencies

As stated earlier, Title 24, Parts 2 and 12 reference the *Uniform Building Code* and *Uniform Building Code Standards* published by ICBO. There are 17 agencies within the State of California that have responsibility for adopting portions of the *Uniform Building Code* and *Uniform Building Code Standards* which makes up parts of the *State Building Code* (Title 24, Parts 2 and 12). Appendix E lists the areas of applicability of the 17 state agencies responsible for portions of the *State Building Code* (Parts 2 and 12) and the enforcing agency of the code.

As an example, the Department of Housing and Community Development (DHCD) is responsible for the largest area of applicability of Parts 2 and 12 of the *State Building Code.* This department is primarily responsible for the building code involving residential buildings, hotels, motels, lodging houses, apartment buildings and mobile home parks. There are currently four individuals within the DHCD primarily responsible for initiating amendments and reviewing all proposed amendments to the *State Building Code* under the responsibility of the DHCD [Ref 25]. The four individuals are program managers also responsible for initiating amendments and reviewing proposed amendments for other parts of the *State Building Code* under the DHCD's responsibility. These parts include: the State Electrical Code (Part 3), the State Mechanical Code (Part 4), and the State Plumbing Code (Part 5). The program managers are all civil servants of the State of California and are not appointed officials.

The Assistant Manager to the State Housing Law Program Manager within the DHCD, is responsible for reviewing and making the adoption decision on proposed amendments to the *State Building Code* within the responsibility of the DHCD [Ref 26]. The assistant manager is a civil servant of the State of California and not an appointed official. The assistant manager may either reject the proposed amendment or approve the amendment for adoption by the DHCD. The assistant manager's decision is based on the review and recommendation of the program manager submitting the amendment for adoption.

C. CALIFORNIA STATE CODE DEVELOPMENT AND REVISION PROCESS

1. Code Revision

Proposed additions and revisions to the *State Building Code* may be submitted by any concerned party to the respective state agency responsible for that portion of the code as described in Appendix E. There is no specific format for proposing an amendment to an adoption agency. The responsible adoption agency may also initiate code changes in its area of responsibility. Figure 7 illustrates the process by which

STATE OF CALIFORNIA CODE CHANGE PROCESS

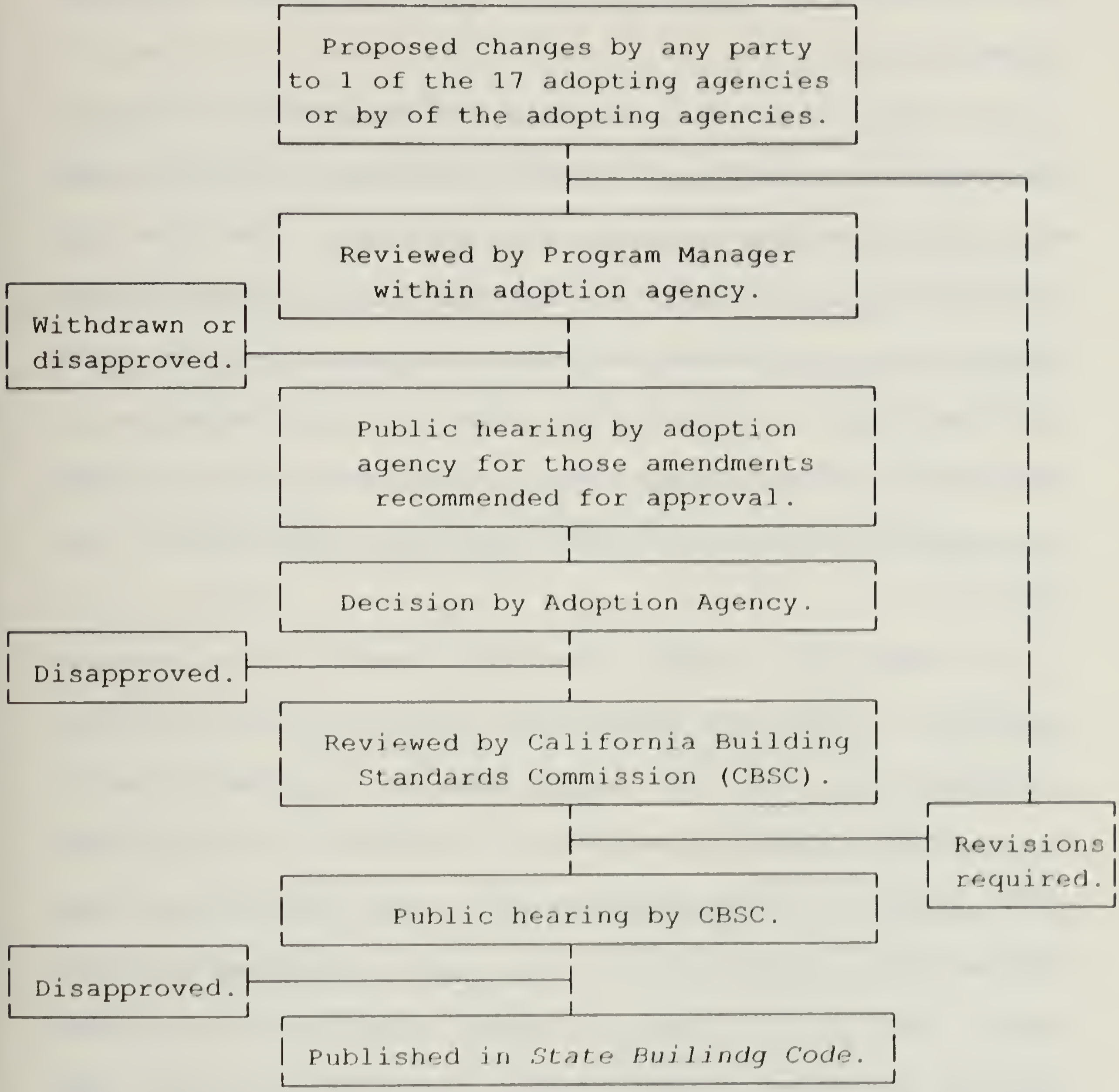

Proposed changes by any party to 1 of the 17 adopting agencies or by of the adopting agencies.
Reviewed by Program Manager within adoption agency.
Withdrawn or disapproved.
Public hearing by adoption agency for those amendments recommended for approval.
Decision by Adoption Agency.
Disapproved.
Reviewed by California Building Standards Commission (CBSC).
Revisions required.
Public hearing by CBSC.
Disapproved.
Published in *State Builindg Code*.

Figure 7

the proposed change to the *State Building Code* is reviewed and decided upon. Changes to the code are made on an as-needed basis.

This thesis will focus on the Department of Housing and Community Development (DHCD) to describe in detail the State of California's code revision process. There are four program managers within the DHCD that are responsible for initiating and reviewing proposed amendments to the *State Building Code*. One of the four program managers is responsible for monitoring amendments to the *Uniform Building Code* adopted by ICBO that impact the *State Building Code* [Ref 26].

The four program managers review all proposed amendments made by other state agencies and private individuals that are the responsibility of the DHCD. One of the program managers stated that individuals are encouraged to first propose amendments to ICBO for adoption into the *Uniform Building Code* prior to proposing amendments to the state. The program manager further stated that the state attempts to adopt as much of the model code and limit the number of state amendments. The four program managers may also initiate amendments they feel are consistent with the DHCD policy. The DHCD does not keep statistics on the number of proposed amendments received by individuals per year, the number of proposed amendments received from other state agencies, the number of proposed amendments initiated by program managers nor the results of the proposals [Ref 25].

Program managers, based on their individual review, have the authority to reject proposed amendments for the DHCD. If a proposal is rejected, the program manager must give a written response with an explanation to the proposing party as to why the proposal was not accepted for adoption. There is no formal appeal process to handle the rejection of a proposed amendment by one of the program managers [Ref 26].

For those amendments recommended for adoption, a public hearing is required to be held by the respective adopting agency, for instance, the DHCD. The DHCD normally holds one hearing per year to consider amendments in its area of responsibility concerning Parts 2 and 12 of the *State Building Code* [Ref 25]. Public notice of these hearings are given through a mailing list maintained by the DHCD. Any interested individual may request to be placed on this mailing list for one year and at least 30 days prior to any hearing [Ref 21:sect. 1-501]. Normally, these hearings are one day in length and held in Sacramento. The hearings are conducted by the respective program managers in the DHCD for amendment in their area of responsibility [Ref 25]. These hearings are used as a forum for the expression of pros and cons by any interested individual, including, design professionals, building officials, industry representatives, and the general public. The length of discussion of proposed amendments at the public hearings varies depending on the proposed amendment [Ref 26]. Records of the hearings are only provided to those individuals requesting a copy of the records from the DHCD.

The transcripts of these hearings are forwarded to the Assistant Manager to the State Housing Law Program Manager with the review and recommendation of the responsible program manager. The final decision to adopt or reject the proposed amendment is made by the Assistant Manager based on the findings of the hearings and recommendation of the program manager. There is no formal appeal process to handle the rejection of a proposed amendment by the assistant manager. An appeal may be made to the CBSC for those amendments adopted.

Proposals that are adopted are then forwarded to the CBSC for approval. The adopted amendments must be justified in accordance with the prescribed criteria outlined in Title 24, California Administrative Code, Section 18930. The criteria are as follows:

1. The proposed building standard does not conflict with, overlap, or duplicate other building standards.
2. The proposed building standards is within the parameters established by enabling legislation.

3. The public interests requires the adoption of such building standards.

4. The proposed building standard is not unreasonable, arbitrary, unfair, or capricious, in whole or in part.

5. The cost to the public is reasonable based on the overall benefit to be derived from such building standards.

6. The proposed building standard is not unnecessarily ambiguous or vague, in whole or in part.

7. The applicable national specifications, published standards, and model codes have been incorporated therein as provided in this part, where appropriate.

8. The format of the proposed building standards is consistent with that adopted by the commission.

Within 120 days from the date of receipt of an adopted amendment, the CBSC must either approve, disapprove, or return the amendment with recommended changes to the adopting agency. Prior to rendering a decision, the CBSC must first review and hold a public hearing concerning the adopted amendment.

All adopted amendments are reviewed by the Coordinating Council to ensure compliance with the required criteria described earlier. The Coordinating Council may recommend to the Commission to either approve, disapprove, or approve with revisions the adopted amendments. An advisory panel may also review an adopted amendment if the CBSC Executive Secretary or if the commissioners deem it necessary.

A public hearing is then held by the commissioners on all adopted amendments. There are normally four hearings per year and the hearings are normally held in Sacramento, CA. The Commission may only review the record of the proceedings of the adopting agency and the evidence submitted to and considered by the adopting agency in making its decision [Ref 21:sec. 18930]. No evidence not previously submitted at the adoption hearing may be submitted at the CBSC approval hearing.

The Commission must have at least five members in attendance in order to conduct a hearing. All decisions of the Commission (i.e., approval, disapproval, approval with revisions) require a majority vote of a quorum, but not less than five votes to carry a decision.

The Commission, on average, reviews and votes on 30 adopted amendments per year. Approximately 90% of these are approved. The 30 adopted amendments are not limited to Parts 2 and 12, but are for all parts of the *State Building Code.* The Program Manager of the CBSC stated, "...no statistics are maintained concerning types of amendments approved and disapproved." [Ref 11] There was no evidence found that an economic analysis is required or performed on proposed amendments. Amendments appear to be primarily based on health and safety requirements, rather than economic considerations.

After approval by the Commission, the adopted amendment then becomes part of the *State Building Code*. A new edition of the *State Building Code* is published in its entirety once every three years incorporating all amendments. In the years between a new edition, a supplement to the *State Building Code* is published annually.

2. Adoption of the *Uniform Building Code* in the California *State Building Code*

The State of California mandates that the *Uniform Building Code* shall apply to all occupancies throughout the state and become effective 180 days after publication by ICBO at the state level and 360 days after publication by ICBO at the municipal level [Ref 11][Ref 21:sect. 18941.5]. Like the *Uniform Building Code*, the California *State Building Code* is also published on a three year cycle which lags behind the *Uniform Building Code* three year publication cycle by one year. Prior to the *Uniform Building Code* becoming part of the *State Building Code*, it must also go through the adoption and approval process described above.

As an example, the Department of Housing and Community Development has one person that monitors and reviews the *Uniform Building Code* to propose amendments to the *State Building Code* which were affected by a revision to the *Uniform Building Code*. There are currently over 1,600 California

State amendments and 16 additional chapters added by the State of California to the *Uniform Building Code* to make up the California *State Building Code* [Ref 27]. Many of the California amendments concern requirements for energy conservation and handicapped individuals. All of the amendments increase the requirements of the *Uniform Building Code*. The 16 additional chapters include detailed requirements for types of buildings such as, hospitals, health facility systems and wild animal quarantine facilities. Amendments to the *Uniform Building Code* made by the State of California are published by ICBO in its publication *California Amendments To The Uniform Building Code*.

D. MUNICIPAL BUILDING CODES IN THE STATE OF CALIFORNIA

To examine use of the *Uniform Building Code* at the municipal level, this thesis focused on two cities in California: San Jose, which is representative of a large city (approximate population of 700,000), and Marina, which is representative of a small city (approximate population of 30,000). San Jose was selected because of its dynamic and diverse construction activity in recent years. Marina was selected because in contrast to San Jose, its construction diversity is limited primarily to residential and single level construction.

Both municipalities are required to use the *State Building Code* which is based on the *Uniform Building Code*. Municipalities may amend the state code to meet local requirements. Amendments at the municipal level are passed by municipal ordinance. A copy of the ordinance must be forwarded to the Department of Housing and Community Development, Division of Codes and Standards for record purposes only. The state does not intervene with local ordinances, unless the ordinance violates state law [Ref 23][Ref 25].

Both city building officials shared the philosophy of trying to impose as few changes to the *State Building Code* as possible, except only when absolutely necessary. The Building Official of the City of San Jose stated, "...San Jose has no city ordinances revising the *State Building Code*." [Ref 10] The Building Official of Marina stated, "...there are only two building ordinances passed by the city." [Ref 9] One of the Marina ordinances increases security of buildings (e.g., installation of peep holes in doors, acceptable types of window and door locks) and the other ordinance requires sprinklers to be installed in all building greater than 10,000 square feet (except residential). The security ordinance was proposed by the Department of Public Safety and the sprinkler ordinance was proposed by the Fire Department. The sprinkler ordinance was proposed by the Fire Department based on the availability of fire equipment within the city and surrounding areas. In both instances, the ordinances were passed by the City of Marina to make the *State Building Code* more restrictive [Ref 9].

Municipal ordinances are passed using a public hearing process before a municipal council of elected officials. Both Building Officials stated they publicize hearings that affect the building code by using a mailing list to contact interested individuals. Both stated that no economic analysis is conducted or required when proposing an ordinance. Also, there was no evidence that municipal building officials or municipal councils perform an economic analysis when deciding on adopting a building ordinance. Ordinances are primarily passed or rejected based on health and safety issues, rather than on economic considerations [Ref 9][Ref 10].

IV. USE OF THE *UNIFORM BUILDING CODE* IN THE FEDERAL GOVERNMENT

A. INTRODUCTION

For all federal agencies, except for the Department of Defense (DOD), the General Services Administration (GSA) coordinates and publishes specifications and standards for the building of federal facilities. There are over 30 federal agencies and departments that develop standards for its specialized building and construction needs. These include the Postal Service, the Bureau of Indian Affairs, the Occupational Safety and Health Administration (OSHA) and the U.S. Forest Service. Within the DOD, the Army Corps of Engineers and the Naval Facilities Engineering Command (NAVFACENGCOM) are primarily responsible for all specifications and standards for the building of DOD facilities. Both of these organizations within DOD have developed comprehensive guidelines for the construction of DOD facilities. This thesis focuses on NAVFACENGCOM as a representative of federal agencies on how it develops and amends its guidelines for construction. [Ref 3:pp. 4-6]

The Navy's attitude toward the development of designs for construction is representative of that of the DOD. The Navy's philosophy is that by standardizing the designs of facilities through an effective design standardization program, more efficient facility designs can be achieved. By basing new designs on past successes which have withstood the "test of time," design standardization improves the likelihood that new facilities will be responsive to user requirements and can reduce the time spent for the programming, design and construction of these facilities. [Ref 6][Ref 28]

Currently, the Navy's use of the model codes in the design standardization program is the result of past influences of private architecture and engineering (A-E) firms with input on designs or design criteria for the Navy. Historically, design specifications and design criteria were originated by Navy staff engineers with the experience and expertise in the field to produce a successful design. Now, designs and to some extent the manuals for design criteria, are more frequently contracted out for completion by A-E firms. Generally, designs that have worked elsewhere and proved successful are used again, however, the designs are greatly influenced by innovation and state-of-the art technology contributed by the A-E firms. This increasing interface with local industry and the willingness of the Navy to build facilities that comply with local building codes has lead the NAVFACENGCOM to establish policies which will incorporate the model codes in the Navy's design criteria and construction practices. A recent law, U.S. Code 101-678 of 17 November 1988, amends the Public Buildings Act (40 U.S.C 601-616) of 1959. It mandates that all federal agencies comply with local building codes, and gives local officials the authority to review and comment on the construction of federal facilities [Ref 5]. The interface between Navy design criteria and the model codes is the focus of this chapter.

The NAVFACENGCOM headquarters establishes policy and renders guidance on all matters concerning the programming, design, construction and maintenance of all shore facilities in the Navy's purview throughout the world. This responsibility includes all Navy facilities, all U.S. Marine Corp facilities, and a portion of U.S. Air Force facilities. The NAVFACENGCOM has seven engineering field divisions with areas of responsibilities as follows:

Engineering Field Division (EFD)	Location	Geographic area of Responsibility
Atlantic Division (LANTDIV)	Norfolk, VA.	States of Virginia, North Carolina and Kentucky, Europe, Africa, Middle East, Central America, South America and the Caribbean.

Engineering Field Division (EFD)	Location	Geographic area of Responsibility
Pacific Division (PACDIV)	Pearl Harbor, HI.	State of Hawaii, Asia, Pacific Islands, Australia, New Zealand and Antarctica.
Western Division (WESTDIV)	San Bruno, CA.	Nine Western United States, including Alaska (except the San Diego, CA region).
Southwest Division (SOUTHWESTDIV)	San Diego, CA.	San Diego, CA region.
Chesapeake Division (CHESDIV)	Washington, D.C.	Washington, D.C. region.
Southern Division (SOUTHDIV)	Charleston, SC.	Includes 13 southeast United States.
Northern Division (NORTHDIV)	Philadelphia, PA.	Includes 25 northeast United States.

As an example, all shore facilities in the State of California, except for the San Diego region, are under the cognizance of the Western Division (WESTDIV) of the NAVFACENGCOM. The San Diego region falls under the cognizance of the Southwest Division (SOUTHWESTDIV).

The NAVFACENGCOM sets the design criteria for use in its design criteria program which governs the scope and quality of construction. Design criteria are established in the form of:

1. Definitive Drawings -- Drawings which convey a generalized design for a facility type including functional requirements, utility needs, and generalized space relationships. These are used as guidelines by architects and engineers for construction projects.

2. Standard Drawings and Specifications -- complete working drawings and specifications for certain facility types which are incorporated into a specific construction project and supplemented with site specific drawings.

3. Design Manuals and Military Handbooks -- General design principles and specific design information for specific facility types.

4. Guide Specifications -- Manuscript specifications which are used as a baseline for specific construction projects. [Ref 29:p. 1]

Since Design Manuals/Military Handbooks and Guide specifications are the most basic criteria which are affected by the model codes, these shall be the focus of this chapter.

Guide Specifications are used as the basis for construction contracts and provide the specifications (i.e., in place of a building code) used by contractors during the actual construction of a facility. Design Manuals in conjunction with Guide Specifications are used by the A-E firms as the Navy's building code during the design of facilities. The Guide Specification update process will first be discussed.

B. GUIDE SPECIFICATIONS UPDATE PROCESS

"Construction guide specifications are the primary reference documents used by designers in preparing the construction specifications (the detailed descriptions of technical requirements) of individual construction." [Ref 30:p. ii] Guide Specifications are manuscript specifications which are prepared for editing as appropriate for use in construction contract documents of a specific construction project. Guide specifications describe products and materials, and the work that is necessary to use them in a construction project. Guide specifications facilitate the preparation of a project specification by standardizing products and processes and their order of presentation, so that it can easily be edited to adapt the guide specifications to the needs of the specific construction project. A guide specification provides detailed descriptions of:

1. The product or system to be provided.
2. The important features of the product or system.
3. The quality of the product or system.
4. The methods by which the quality is to be verified.
5. The method used to incorporate the product or system into the project.
6. The on site quality control procedures.
7. Other necessary procedures to satisfy project requirements. [Ref 29:pp. 1-2]

The NAVFACENGCOM develops and maintains Guide Specifications at six of the seven engineering field divisions. The engineering field divisions are assigned guide specifications based on the expertise of the engineering field division. A-E's preparing construction specifications and drawings are given the following guidance, as quoted from WESTDIV's *A-E Guidance* for Architect Engineer firms performing services for the Department of the Navy WESTDIV NAVFACENGCOM.

> Department of Defense directives require the use of standardized manuscripts to be edited for the specific competition in the expenditure of public funds. The standard manuscripts to be used are the Guide Specifications listed in the current Quarterly List of Guide Specifications int he WESTDIV Criteria System for use in construction Contracts. Reference specifications are the current issues of the industrial or commercial standards and the federal and military specifications listed in the Guide Specifications. For materials, equipment, coatings, etc. which are not included in the guide Specifications System, the A-E shall prepare a combination performance-description specification which permits non-restricted competition. The design criteria contained in the NAVFAC[ENGCOM] Design Manuals (DM's) and the NAVFAC[ENGCOM] "P" publications shall be used to the extent required within those criteria. [Ref 31:pp. vi-1]

There are 350 NAVFACENGCOM guide specifications (NFGS) currently used by the Navy [Ref 6]. A list of the NFGS are in Military Bulletin 34, which is attached as Appendix E. Each guide specification is organized in a three-part format. The first portion is devoted to general information such as references to pertinent publications and information and required administrative procedures. The second portion details the material requirements for the type of work addressed, along with pertinent standards. The third portion covers the construction execution such as the details for preparation, installation requirements, processes and procedures.

Guide specification systems all follow the Construction Specifications Institute (CSI) sixteen division format. This format uniformly organizes construction criteria. For example, Division 1 contains general contract requirements, and Divisions 2 through 16 contain requirements segregated into specific technical areas. The CSI 16-division and three part format provides a format consistent with industry-wide application, which facilitates locating specific information through a consistent section location format.

Each of the engineering field divisions has a design division responsible for the writing of construction guide specifications. A criteria coordinator/manager at each engineering field division closely coordinates with the NAVFACENGCOM headquarters criteria manager. The criteria coordinator/manager is responsible for the management of the total number of guide specifications assigned to the engineering field division. They are the interface between the NAVFACENGCOM headquarters and the guide specification author. Specifications are developed and maintained by the NAVFACENGCOM architects and engineers or through contracts with A-E firms.

In the DOD, guide specification systems are maintained by the NAVFACENGCOM and the U.S. Army Corps of Engineers. Efforts have been made to create a tri-service committee to coordinate preparation of guide specifications with the DOD and to promote development of a consolidated tri-service guide specification [Ref 32:p. 1]

Guide specifications are reviewed and updated by the U.S. Army Corps of Engineers and the NAVFACENGCOM on a five year cycle. The specifications are reviewed by the beginning of the third year to determine if updating is required. The average age for specifications maintained by the NAVFACENGCOM is 3.6 years [Ref 30:p. 4-5]. In the NAVFACENGCOM system, if update is required, the work is done in-house or contracted out to an A-E firm depending on 1) availability of funds, and 2) the complexity or sensitivity of the facility design [Ref 33]. In practice, a majority of the guide specifications are updated in-house [Ref 6][Ref 33][Ref 34][Ref 35][Ref 36]. If A-E firms are selected to update guide specifications, they are selected on the basis of their expertise and experience in the facility type [Ref 33]. The DOD design criteria is used to update all guide specifications. The NAVFACENGCOM's policies and procedures for updating guide specifications, DM 6.02, is now Military Handbook 1006/2. In the DOD Military Handbook for *Policy and Procedures for Guide Specifications*

Preparation, a list of criteria sources to be used in preparing guide specifications is cited in Military Bulletin 34 (MIL-BUL-34), *Engineering and Design Criteria for Navy Facilities*. This portion of the Military Bulletin is attached as Appendix E. A-Es are given the same design criteria when contracted to perform updates. The philosophy in performing revisions is to update all specifications to the norm of industry [Ref 33][Ref 34][Ref 35]. "The EFD [engineering field division]...has responsibility for the maintenance of the guide specification, providing direction on using the guide specification, correction of errors or problems in the guide specification, and ensuring that the guide specification reflects the current state of the art of the construction materials and methods in the guide specification." [Ref 29:p. 3] Thus, if industry norms are more stringent than Navy criteria, the Navy is advised of such incidents by the A-E. A-Es generally recommend the more stringent criteria, but ultimately the Navy makes the decision as to whether to incorporate the more stringent criteria. Cost benefit analyses or life cycle cost analyses are not routinely performed in those instances where the Navy design criteria exceed industry practices. However, it is up to the discretion of the engineer in charge of updating the specification to determine whether a value engineering study may be performed. Value engineering studies are performed by a value engineering team who investigates whether in such instances, it would be feasible for the Navy to relax its requirements to match the norm of industry. Recommendations are made based on their findings. Due to funding constraints, value engineering studies cannot be performed in all cases where Navy criteria exceed industry practices [Ref 6][Ref 35].

The following process is then followed by most engineering field divisions:

1. Copies of the existing guide specification are distributed in a letter to all engineering field divisions, all branches of the military, A-E firms with expertise in the field and all possible members of industry (manufactures and contractors) who may have an interest in the field. The number of industry contacts asked to review the draft is up to the discretion of the engineering field division. The letter requests any comments updating or revising the existing specification.

2. Upon receipt of the comments, a first draft is written incorporating the comments as necessary. Any comments that are rejected must be explained in a letter to the originator of the comment with justification as to why the revision was not implemented. The explanation must be to the satisfaction of the originator.

3. The first draft is again sent out to the same reviewers for additional comments.

4. Upon receipt and review of the second comments and following the same procedure as the review of the initial comments, a pre-final draft is made, incorporating the additional comments.

5. The pre-final draft is then sent to the NAVFACENGCOM headquarters for final approval.

6. The NAVFACENGCOM publishes the updated guide specifications and distributes them to the using agencies. [Ref 6][Ref 33][Ref 34][Ref 35]

In some engineering field divisions, only one iteration of specification review and comment takes place [Ref 35]. Most engineering field divisions are sensitive about ensuring that all affected members in the local industry have a chance to review the guide specification that have potential impact on their industry [Ref 6][Ref 33][Ref 34]. There are incidents where the engineering field division is contacted by congressman as a result of a member of the industry perceiving himself as being treated unfairly by the guide specification [Ref 33]. The entire update process varies in length, depending on the extensiveness of the revision. The recommended time periods are as follows [Ref 29:p. 4-8]:

1. Revalidation of an NFGS or adoption of share guide specifications -- 90 days.
2. Minor revision of an NFGS -- 120 days.
3. Creation or a major revision of an NFGS -- 240 days.
4. Cancellation or retirement of an NFGS -- 60 days.

A study comparing the DOD guide specification system with commercial specifications systems was conducted by the Logistics Management Institute (LMI) in 1985. A-E firms were interviewed and asked how the DOD guide specification system compared with commercial systems:

> They all strongly support using the CSI 16 division, 3 part format. Many A-E firms believe that commercial systems have positive attributes that the DOD guide specifications should emulate, particularly streamlined wording. The A-E firms uniformly believe that the separate COE [U.S. Army Corps of Engineers] and NAVFAC[ENGCOM] systems should and could be merged into one tri-service guide specification system. From the view of these design firms, a tri-service guide specification would be of tremendous benefit to both the DOD and the A-E industry. They see it as an important step toward a much-needed national standard in construction specification organization and structure. They strongly believe a tri-service guide would reduce errors in contract documents and construction oversights.
>
> All A-E firms express the need for the DOD to simplify and streamline the guide specifications, to eliminate the use of MIL specifications and FED specifications, to see improvements in the distribution of guide specification updates and revisions, and to have the guide specifications made available in a in a variety of word processing formats. A-E firms do not consider technical problems within the specifications themselves to be significant and in most cases are more concerned about word process capabilities than any technical shortcomings. [Ref 30:p. 2-3]

Since this study, progress has been made by the NAVFACENGCOM in the movement toward a tri-services guide specifications system. A-E firms are contracted to compile guide specifications for a specific facility type, from all branches of the service. The process includes opportunities for all services to review the specifications and input their concerns or recommend revisions. Features that are unique to specific services are pointed out as such in the specifications. The final product is a tri-services guide specification that all service use.

Improvements in the distribution of guide specifications and word processor readiness have been made as well. An organization called the National Institute of Building Sciences (NIBS), established by Congress in Public Law 12, Section 1701j-2, in 1974, maintains a database of more than 150,000 pages of construction specifications by the NAVFACENGCOM, U.S. Army Corps of Engineers, DOD, NASA and Veterans Administration called the Construction Criteria Base (CCB). The NIBS updates and records all guide specification and design criteria on CD-ROM optical discs. The database is useable with IBM-PC XT or compatible computers. Federal agencies subscribe to NIBS for updated copies of the discs. Improvements such as these has lead to a more efficient and streamlined guide specification update system. [Ref 6][Ref 33][Ref 36]

The NAVFACENGCOM has adopted a specifications processing system called "SPECSINTACT" an acronym for "Specifications-Kept-Intact," included as part of the CCB. Guide specifications are revised and prepared using SPECSINTACT. SPECSINTACT is also available from NIBS. [Ref 3:p. 4-1] [Ref 29:p. 4]

When no guide specifications are available, WESTDIV's guidance to A-E firms is the following:

> In specifying products for which no guide specification exists, the specification shall be prepared in the three part format following the criteria established in DM-6, Chapter 3 [Superseded by MILHANDBOOK 1006/2]. The A-E should review a guide specification for a similar product to determine the content of the section. The product description should be based on nationally recognized industry standards, or if none are available, on federal or military specifications. Should not established standards exist, prepare performance description of the product such that not less than three manufactures can meet the specifications. The performance description should define the product functions and any physical limitations. Proprietary terms should be avoided. [Ref 31:p. VIII-12]

Guide specifications are the basis for standardized designs by which Navy facilities are constructed. However, the criteria upon which these specifications are based have an even greater importance. This is the topic of the next section.

C. DESIGN CRITERIA UPDATE PROCESS

Guide specifications are written from design criteria in the form of Design Manuals, now referred to as Military Handbooks. Military Handbooks are the criteria used by the Navy to ensure that a minimum code is met by designers preparing specifications for the Navy. Military handbooks contain standard procedure, technical, engineering, design, and construction information and related data, which are available for use by all DOD activities. They strive to develop standardized products and methods to satisfy military requirements and to avoid duplication of descriptive information among the various services. All military handbooks listed in Military Bulletin 34 (Appendix E) are mandatory guidance [Ref 37:p. 5]. The NAVFACENGCOM's purpose for employing criteria is as follows:

> Criteria are developed to define facilities engineering and design technology, functional/operational requirements, and health and safety for personnel (Navy and civilian). Building codes establish minimum and safety standards; NAVFAC[ENGCOM] criteria establishes owners interlocking functional requirements. There are over 14,000 local versions of the three model building codes in the United States. There often are 5 to 30 different authors for a particular subject that applies to the Navy. Consideration is given to adopting applicable local criteria: this is weighed against the broader scope needed to establish criteria which will be effective across the entire Navy to ensure quality and consistency. [Ref 37:p. 1]

Directly or indirectly, Military Handbooks are to some degree influenced by the model codes. Appendix F lists the NAVFACENGCOM Military Handbooks that reference model codes. The NAVFACENGCOM strives to keep all design manuals abreast of the norm of industry practices. Industry practices are dictated by the adherence to the model codes as minimum requirement. Thus, military handbooks often meet or exceed the requirements of the model codes [Ref 6]. The current policy of the NAVFACENGCOM concerning "model building codes" is as follows:

> There is no justification at present for NAVFAC[ENGCOM] to select only one of the three model building codes to

> reference for NAVFAC[ENGCOM]-wide use, nor can NAVFAC[ENGCOM] rely solely on all three model building codes to satisfy all of the shore facility criteria requirements. [Ref 47:p. 3]

Updating military handbooks is also the responsibility of the NAVFACENGCOM. The updating of the military handbooks is divided among the engineering field divisions. All military handbooks are updated continuously as functions or technologies change. Each preparing activity ensures that all significant technical changes are made to their assigned documents and published as quickly as possible. The changes are always reflected in the Construction Criteria Base (CCB) which is available through NIBS. However, every five years each document is considered for republication in paper form [Ref 37:p. 3-4] A criteria update priority system is exercised by the NAVFACENGCOM, as follows:

1. First -- Military Readiness.
2. Second -- Life, Safety and Health.
3. Third -- Technology Update.
4. Fourth -- Age of Document.

As with guide specifications, military handbooks are usually updated in-house, although a small percentage are updated by A-E firms. If the handbooks are updated by an A-E firms, the firm is selected on the basis of expertise and experience in that particular area of design [Ref 33]. The guidance to

A-E firms are similar to that for guide specifications: update to meet the norm of industry standards and model codes. The use of non-Navy criteria is encouraged [Ref 37:p. 4]. Engineering field divisions, one in particular, try to ensure that all applicable model codes are met, not just the *Uniform Building Code* [Ref 34]. Although the engineering field divisions attempt to incorporate model codes as much as possible, a NAVFACENGCOM study shows the following:

> Referencing of the three model building codes, at least in the NAVFAC[ENGCOM] Design Manual/Military Handbook 1 through 8 series, is minimal at present. To assess the extent of present referencing of three model building codes, fifty two documents were examined. Only six documents make direct reference to one of the three model building codes...The unanimous choice among the codes referenced in these NAVFAC[ENGCOM] general manuals/handbooks is the *Uniform Building Code*. The percentage of reference (11%), however, is not significant enough to conclude that there is general NAVFAC[ENGCOM] endorsement of a single model building code at this time. [Ref 47:p. 3]

Similar to the update of guide specifications, the process to update design criteria is as follows:

1. Copies of the existing draft are distributed in a letter to all engineering field divisions, all branches of the military, A-E firms with expertise in the field and all possible members of industry (manufacturers and contractors) who may have an interest in the field. The number of industry contacts asked to review the draft is up to the discretion of the engineering field division. The letter requests any comments updating or revising the existing specification.

2. Upon receipt of the comments, a first draft is written incorporating the comments as necessary. Any comments that are rejected must be explained in a letter to the

originator of the comment with justification as to why the revision was not implemented. The explanation must be to the satisfaction of the originator. [Ref 35]

3. The first draft is again sent out to the same reviewers for additional comments.

4. Upon receipt and review of the second comments and following the same procedure as the review of the initial comments, a pre-final draft is made, incorporating the additional comments.

5. The pre-final draft is then sent to the NAVFACENGCOM headquarters for final approval.

6. The NAVFACENGCOM publishes the updated Military handbooks and distributes them to the using agencies. [Ref 6][Ref 33]

In some engineering field divisions, only one iteration of specification review and comment takes place. The military handbooks are distributed to all NAVFACENGCOM agencies and A-E firms performing design work for the Navy.

V. ANALYSIS OF ICBO AND THE *UNIFORM BUILDING CODE*

In Chapters II through IV, this thesis examined the International Conference of Building Officials (ICBO) and government agencies, to define the *Uniform Building Code* code development and adoption process. This chapter will analyze the code development process and the adequacy of the *Uniform Building Code*.

A. THE ICBO PROCESS

In analyzing the code development process this thesis specifically addressees the adequacy of ICBO's policies on its organizational structure and the methodology exercised in developing codes.

1. Organization

ICBO's membership is open to any interested individuals, and government and private agencies. However, members are stratified into different categories which gives all code development voting power to Class A governmental members. As defined in Chapter II, a Class A governmental member is a government unit or agency engaged in the administration or formulation of laws and ordinances relating to building construction. Each governmental unit is entitled to only one vote independent of the size of representation.

This is in contrast to other code and standard writing organizations, such as the National Fire Protection Agency (NFPA) which writes the National Electric Code (NEC) and the American Standards for Testing and Materials (ASTM) to conform with the American National Standards Institute (ANSI) requirements for developing voluntary standards. ANSI requires that "...due process means that everyone with a direct and material interest has a right to express a viewpoint and, if dissatisfied, to appeal at any point...without dominance by any single interest...." [Ref 39:p. 4] The reason for disallowing a dominance by a particular interest group is to ensure that codes and standards are not written to unfairly favor one segment of the industry. ICBO's policy on allowing only governmental Class A members to vote, appears to give the building officials, a single interest group, dominance over the development of the *Uniform Building Code.*

ICBO's philosophy on its membership and voting eligibility policy were expressed by the Manager of Code Development:

> ICBO's policy of allowing only officials to vote avoids "stacking votes" by a special interest group. Other code writing organizations have in the past experience problems

> with "vote stacking" by a special interest group by increasing membership of an interested segment prior to a vote. ICBO's policy prevent this problem. [Ref 15]

At the municipal level, the building officials of a small and large city[4] interviewed agreed with ICBO's policy of allowing only governmental Class A members to vote. However, they disagreed on the fairness of a one vote per municipality regardless of the size of representation.

The building official of the larger city stated that "...small cities have too much power under this policy; a vote from a smaller city carries the same weight as a vote from a larger city that represents a larger population." [Ref 10] The building official from the small city agreed with ICBO's one vote per municipality policy [Ref 9].

ICBO's Code Development Committee members are Class A members appointed by the Board of Directors. As discussed in Chapter II, the Manager of Code Development stated that the selections are made on the basis of experience and expertise in the specific code development area and level of involvement in ICBO activities. Members of the Code Development Committees are rotated among municipalities from different geographic regions. Since Code Development Committees have the authority to approve or disapprove code revisions unless appealed, members of these committees have a greater influence on the code revision process than all other members of ICBO. At the municipal level, the building officials have differing perceptions of their room for involvement in the Code Development Committees, as a result of the size of the municipalities they represent. The building official of the smaller city state that "...the larger cities have the resources to be members of Code Development Committees where small cities lack the personnel and time to be a member of a Code Development Committee." [Ref 9] The building official of the larger city, on the other hand, had served on Code Development Committees numerous times, and had the personnel to allow him to do so [Ref 10].

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[4] Marina, CA was the small city (approximate population 30,000) and San Jose, CA was the large city (approximate population 700,000).

Of all the agencies interview, the municipal level was the most active member in the ICBO code development process. The state level agencies were the next active, while the federal agencies were not involved.

2. Methodology

ICBO operates as a nonprofit organization and sustains itself primarily through the sale of its publications and services to the private and municipal sectors. ICBO is sensitive regarding the appearance of influence by any outside organization, and therefore does not accept contributions in any form. No evidence was found as a result of interviews that suggest that ICBO's practices are influenced by special interest groups. [Ref 9][Ref 10][Ref 13][Ref 14][Ref 40]

ICBO's primary objective of the *Uniform Building Code* is to provide minimum standards to safeguard life and limb, health, property, and public welfare by regulating and controlling the design and construction of facilities. As ICBO's primary objective states, health and safety are ICBO's primary concerns when developing and revising the *Uniform Building Code*. Economic considerations are not weighed, when health and safety concerns are affected by the code. As a result, no cost-benefit or life cycle cost analysis are required when developing and revising the *Uniform Building Code*. An economic analysis[5] is often performed when considering amendments that do not directly affect health and safety, such as introduction of a new building material.

B. USE OF THE *UNIFORM BUILDING CODE* BY GOVERNMENT AGENCIES

Analyzing the adequacy of the *Uniform Building Code* by government agencies was based on interviews of government officials at the municipal, state and federal levels. This analysis gives only an indication of the adequacy of the

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[5] No evidence of a structured economic analysis was found to be required by ICBO. The magnitude of the economic analysis was left to the discretion of the submitting agency/individual.

Uniform Building Code for use by government agencies due to the limited number of interviews conducted.

1. State and Municipal Agencies

The State of California has adopted the *Uniform Building Code* as the basis for its *State Building Code.* There are 17 agencies within the state that have authority to amend the *State Building Code* that references the *Uniform Building Code.* The State of California has made over 1,600 amendments to the *Uniform Building Code* and have included an additional 16 chapters in the adoption of the *Uniform Building Code* as the *State Building Code.*

The State of California has adopted many changes to the *Uniform Building Code*, but these changes are to tailor the code to problems unique to California. The amendments and additional chapters made by the State of California are largely attributed to energy conservation, handicapped and applications not covered by the *Uniform Building Code* [Ref 13][Ref 14][Ref 41]. The Code Development Manger of ICBO state that "...these amendments would not be required for construction outside of California due to climatic, geographic and political philosophies." [Ref 41] He further stated that California does submit recommended revisions to the *Uniform Building Code* if they think they are applicable to other states as well.

The two municipal agencies interviewed both stated that the *Uniform Building Code* could be used as a building code without the state amendments. The large city building official has not made any amendments to the *Uniform Building Code* and the small city has made only two amendments. The two amendments made by the small city were proposed by the Public Safety Department of the city to increase personal security in residential buildings, and the other was proposed by the Fire Department to include sprinklers systems in building greater than 10,000 square feet (except residential buildings) due to the limitation of fire fighting equipment in the city.

2. **Federal Agencies**

The federal agency examined was the Naval Facilities Engineering Command (NAVFACENGCOM). The NAVFACENGCOM has no involvement in the development of the *Uniform Building Code.* ICBO also stated that no federal agency is involved in the development and revision of the *Uniform Building Code.* In the past, the NAVFACENGCOM has used the *Uniform Building Code* to keep abreast with the construction practices that are the norm of the construction industry.

It is the opinion of the criteria manager at the NAVFACENGCOM, Western Division, that the Navy design criteria are more stringent than the *Uniform Building Code.* As an example, the Navy design criteria for Bachelor Enlisted

Quarters (BEQ) require the use of metal doors on all rooms, which is above the requirements of any of the model building codes [Ref 6]. This requirement is based on past experiences that have shown that a more stringent requirement than the model building codes is applicable for Navy BEQs. Thus, while Architect-Engineering (A-E) firms are tasked to keep up with the norms of industry practice, they must also be familiar with the requirements of the design criteria set forth in the Design Manuals and Military Handbooks to ensure that the more stringent of the two criteria is followed [Ref 6]. Three of the A-E firms and one construction firm under the purview of the NAVFACENGCOM, Western Division, were interviewed for this thesis, and all agreed that performing designs for the Navy requires familiarity with Navy criteria as well as with local building codes [Ref 42][Ref 43][Ref 44][Ref 45]. In all cases, A-E firms stated that when performing Navy design work, if any difference exists between the local building code and the Navy design criteria, the more stringent criteria are recommended. The decision to use the more stringent of the two criteria is made by the engineering field division responsible for the design and construction of the facility.

The three A-E firms and the construction firm interviewed stated that they do not hesitate to do Navy projects because of the differences in building criteria. All of the firms stated that when differences do occur in the design and construction criteria between Navy projects and non-Navy projects, there was no problem keeping abreast with the differences once they grew accustomed to the Navy system. They all stated that it would be easier to use the Navy criteria, if it were formatted similar to the local building codes. [Ref 42][Ref 43][Ref 44][Ref 45]

Because of recent initiatives by the Department of Defense to use model codes as a baseline, and the recently enacted law requiring federal agencies to conform with local building codes, the NAVFACENGCOM use of the *Uniform Building Code*, and also the use of the other two "model building codes," will be required to be more deliberate and systematic. This required change in the use of the "model building codes" in Navy building criteria parallels with the desires of firms performing design and construction for the Navy. The NAVFACENGCOM has only recently started the process of formulating policies to implement these initiatives.

C. EFFECTIVENESS OF THE *UNIFORM BUILDING CODE*

All parties interviewed, including government agencies, architect-engineers and a construction contractor agreed that the *Uniform Building Code* was an effective and essential tool in the design and construction of facilities. The only negative comment received about the *Uniform Building Code* was from the building official from the City of Marina, California who stated, "...the *Uniform Building Code* is written in legal terms which makes it difficult for many people to understand." [Ref 9] Because of the difficulties of understanding the *Uniform Building Code*, the City of Marina provides a simplified version[6] of the *Uniform Building Code* when deficiencies are found during the review of plans and specifications, and also to any individual requesting an interpretation of a code requirement [Ref 9].

All of these comments contribute to formulation of a conclusion of whether ICBO is effectively providing the *Uniform Building Code* as a public good in sufficient quantity. This is the topic of the next chapter of this thesis.

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[6] Requirements of the *Uniform Building Code* have been rewritten by the Building Official of Marina in simpler terms.

VI. CONCLUSION

This thesis was undertaken to examine the International Conference of Building Officials (ICBO) and to determine whether ICBO is producing a public good in the form of the *Uniform Building Code* in sufficient quantity to meet the requirements of all parties that are affected by the *Uniform Building Code.* The approach to this task was to first examine the methodology ICBO uses to develop and amend the *Uniform Building Code* to the satisfaction of its users. This was followed by an examination of the subscribers and users of the *Uniform Building Code* at different government levels and private users in the construction industry. This enabled an analysis of the perceived effectiveness of the *Uniform Building Code* by these consumers of this public good. Conclusions from this analysis are discussed and recommendations made in this chapter.

A. SUMMARY

Based on the analysis of ICBO in Chapter V, it is concluded that ICBO is producing a public good, in the form of a baseline building code, and is providing it satisfactorily to its users. No evidence was found to indicate ICBO is not effectively and impartially producing the *Uniform Building Code*. ICBO is an organization providing a baseline model building code which is adopted as law by states and municipalities throughout the United States. It appears that ICBO is responsibly providing this baseline model building code through methods which are impartial and effective in achieving this end. Although these procedures are not consistent with other standard writing organizations, no evidence was found to indicate that these procedures are any less effective or less impartial in producing a voluntary code than other standard writing organizations.

Information from state, municipal and private users of the *Uniform Building Code* further supports the conclusion that ICBO is effectively producing a public good (i.e., baseline building code) in sufficient quantity. State and local municipalities that have adopted the *Uniform Building Code* are benefitting from ICBO's mechanism for research and development of new construction methods which ICBO provides at a negligible cost to individual state and municipal governments. When state and municipal governments adopt the *Uniform Building Code*, each individual in the jurisdiction of the state or municipal government is therefore benefitting from ICBO's public good at zero marginal cost in the form of safer buildings and uniform construction of facilities.

No evidence was found that federal agencies are actively involved in developing the *Uniform Building Code*. The thesis research did find that the Naval Facilities Engineering Command (NAVFACENGCOM), under the direction of the Department of Defense (DOD), has initiated policy to explore the possibility of using "model building codes," including the *Uniform Building Code*, for construction of Naval facilities to eliminate redundant design and construction criteria currently used by the Navy. Also, this thesis revealed Public Law 100-678, "Public Buildings Amendments of 1988," which mandates that all federal agencies comply with one of the nationally recognized "model building codes" in the construction, renovation and repair of all federal facilities. Based upon the finding that the *Uniform Building Code* is an effective "model building code," it is concluded that the NAVFACENGCOM should do further research on the recommendations made in the next section of this chapter regarding the use of "model building codes" in the design and construction of Naval facilities.

B. RECOMMENDATIONS

There is only one recommendation for ICBO. Although there was no evidence that users of the *Uniform Building Code* expressed a need for a detailed economic analysis when submitting code changes or additions, it is recommended that ICBO require an analysis to determine the total cost and savings where applicable, of proposed code changes. A standardized economic analysis should be required when submitting code changes for review by the Code Development Committees. This analysis would be used as additional information in rendering a decision, but it not recommended that it be used as the only criterion for code changes.

As stated earlier, the NAVFACENGCOM has established a policy to use "model building codes" for the construction of Naval facilities. The NAVFACENGCOM has established goals to use the three model codes as a baseline for Navy design criteria [Ref 41:p. 1]. However, no definite policy was found that described how the three "model building codes" would be used by the NAVFACENGCOM. To implement this policy, it is recommended that each "model building code" be used as a baseline and each be amended to meet Navy criteria. A similar amendment procedure used by the State of California to amend the *Uniform Building Code* to the *State Building Code* should be researched to determine whether this procedure could be employed by the NAVFACENGCOM to amend each of the "model building codes." The amendment procedure referred to includes only the publishing of amendments through a supplement of the *Uniform Building Code* and not the public hearing process of approving changes.

Each of the three "model building codes" is recommended as an individual baseline since the Navy performs construction throughout the United States where all three "model building codes" have been adopted by different states and municipal governments. This will also facilitate compliance with "Public Buildings Amendments of 1988" (Public Law 100-678), that mandates federal agencies to comply with one of the nationally recognized "model building codes." The "model building code" applicable to the municipality in which the Navy facility is located would apply in conjunction with the Navy amendments to the code. In practice, there would be one uniform "Navy Building Code," which would have three versions, adapting the three "model building codes" to the uniform "Navy Building Code."

Further research might involve determining whether the model building code writing organizations would publish the federal amendments as ICBO does for the State of California. This would save reproduction and distribution costs to the Navy since users would be required to buy the "Navy Building Code" from the model code writing organizations. This would provide a "Navy Building Code," in most regions of the United

States, similar in structure and basis as the building code used for non-Navy construction in that region. Such a change would provide a "Navy Building Code" that references a building code already familiar to members of the design and construction industry in that region.

STATE OF CALIFORNIA GEORGE DEUKMEJIA

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS - Administrative Office
6007 Folsom Boulevard, Suite A, Sacramento, CA 95819
Mailing Address: P.O. Box 1407, Sacramento, CA 95812-1407
(916) 445-9471

February 21, 1989

INFORMATION BULLETIN SHL 89-03

TO: CITY BUILDING OFFICIALS
COUNTY BUILDING OFFICIALS
HOUSING CODE OFFICIALS
FIRE SERVICE OFFICIALS
INTERESTED PARTIES (SHL)
DIVISION STAFF

SUBJECT: ADOPTION DATES OF THE 1988 UNIFORM MODEL CODES

In conformance with Health and Safety Code Section 17913, the following information is provided in relation to the adoption of the 1988 Editions of the Uniform Model Codes. Included are the Uniform Building Code published by the International Conference of Building Officials, the Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials, and the Uniform Mechanical Code published by the International Conference of Building Officials and the International Association of Plumbing and Mechanical Officials.

Publication and Effective Date For State Enforcement	Effective and Enforcement Date For Local Jurisdictions
July 1, 1989	January 1, 1990

If you have questions regarding these adoptions, please contact the State Housing Law Program Manager at (916) 445-9471.

Sincerely,

John Ellis
Acting Chief

JE/CMC:pm

APPENDIX B

CALIFORNIA BUILDING STANDARDS COMMISSION

(June 28, 1989)

[Reprinted from Ref 22]

The California Building Standards Commission (CBSC) is within the State and Consumer Service Agency. It was created to review, approve, and publish building standards adopted by state agencies in one State Building Standards Code (Title 24). A summary of key events that led to the CBSC put its role into precise context with the process by which building standards are adopted, approved, published, used as a design and construction tool, and enforced. The following is a chronology of those events:

1905 One of the earliest attempts to unify codes on the national level was the National Board of Fire Underwriters successfully promoting a "Recommended National Building Code."

1909 The first public building law was enacted in California and was called the State Tenement Housing Act.

1913 The State Division of Immigration and Housing was created along with a State Division of Safety. Each had separate regulatory authority, and this established an unfortunate precedent of having different departments of the State responding individually to specific building problems which had statewide interest.

1927 The Pacific Coast Building Officials (now the International Conference of Building Officials (ICBO)) published the first *Uniform Building Code* (UBC). The *Uniform Building Code* published by ICBO have been adopted by reference or have been used as a pattern by most local governments. The UBC is one of the most important documents in promoting uniformity of building codes in California.

1933 The Field Act was a legislative response to the Long Beach earthquake and it assigned responsibility for the design and construction of public schools to the State Architect. This is another example of a separate regulatory authority adopting building standards in its own title--in this case, Title 21.

1972 The Hospital Seismic Safety Act was generated by the San Fernando earthquake of 1971. It provided for State preemption of the design and construction of certain emergency health facilities. The regulations were placed in Title 22.

This policy has resulted in a situation where over 20 agencies, ranging from the Barbers' Licensing Board to the State Architect, adopt building standards and publish them in the separate titles of the California Code of Regulations.

Legislation

The present CBSC was created in 1980 by SB 331. It was established to correct the problems created by the confusion resulting from the uncoordinated proliferation of conflicting, duplicative, and overlapping State regulations. It was not the first time that the problem was recognized, nor was it the first time that an attempt was made to correct the situation. The following is a history of those attempts:

1949 House Resolution No. 183

The resolution established a panel to study the building code issue and report back to the Legislature. One of the comments in that report was as follows:

"The state has no one agency concerned principally with building regulations. There are at least ten state agencies having some degree of authority in this field, and not one of them is responsible for taking the lead in coordinating the activity of all of them. This produces two kinds of confusion--conflict between state agencies themselves, and too many kinds of relationships between state and local agencies.

There is no consistent pattern for defining the relative responsibility of the state and of local agencies in enforcing state regulations."

1953 State Building Standards Law

The initial State Building Standards Law was enacted in 1953 (Chapter 1500, Statues of 1953). As originally enacted, the law established a California Building Standards Commission with limited powers to control the building standards regulatory process. The CBSC could not question the substantive provisions of the code if it found technical defects, or that the provisions would have a negative impact on the public. Also, the CBSC had no control over the filing of a building standard with the Secretary of State, and no appeal powers. Because of its limited powers to control the building standard regulatory process, the CBSC was unsuccessful in its attempts to resolve long-standing problems that made it almost impossible for users of the code to understand and comply with it.

Building standards continued to be buried in different title of the Administrative Code--OSHA in Title 8, Health in Title 17, Fire Marshal in Title 19, Hospitals in Title 22, etc. There was no codification of indexing, and these standards were scattered through the 30,000 plus pages of the California Administrative Code. Enforcement was complicated, costly, and in some cases, nonexistent.

1957 Senate Interim Committee on Governmental Organization

An excerpt from a Committee report which reviewed building standards stated:

"The handicaps under which the California Building Standards Commission operates emphasize the inadequacy of halfway measures. The promulgation of the State Building Standards Code would eliminate some of the confusion resulting from uncoordinated building regulations issued by the various state agencies but would not be a substitute for an integrated department or agency with the responsibility for administration of the state's building laws activities."

1970 SB 952 (Moscone)

This bill proposed to create a Board of Building and Safety with sole authority to adopt building standards. It was opposed by the State agencies who were adopting building standards. It was vetoed.

1973 AB 2265 (Greene)

This administration bill would have abolished the Department and Commission of Housing and Community Development and created a department of Building and Safety. It did not pass.

1978 SB 331 (Robbins)

Effective January 1, 1980, legislation provided broader powers to the CBSC (SB 331, Chapter 1152, Statues of 1979). As a result of this legislation, all proposed building regulations promulgated by the various State departments must be reviewed and approved by the Commission before they have any force or effect. Further, the legislation calls for all building standards to be removed from other titles of the California Code of Regulations and put into a single code, or Title 24. The Commission is responsible for codifying and printing of Title 24. In addition, since January 1980, the Commission is charged with reviewing proposed regulations to be sure they meet the following criteria found in Health and Safety Code Section 18930(a):

1. The regulation does not conflict, overlap, or duplicate other regulations.

2. The regulation is within parameters of enabling legislation.

3. It is in the public interest that the regulation be adopted.

4. The regulation is not unreasonable, arbitrary, unfair, or capricious.

5. The cost to the public is reasonable, based on the overall benefit to be derived from the regulation.

6. The regulation is not ambiguous or vague.

7. Applicable national standards, published standards, and model codes have been incorporated.

8. The format is consistent with that adopted by the Commission.

9. The regulation, if intended to promote fire and panic safety, has the written approval of the State Fire Marshal.

In addition, the Administrative Procedure Act (APA) requirements with respect to the procedure for adoption of regulations (Government Code Section 11346 et al.) must be met.

1989 AB 4616 (Lancaster)

Effective January 1, 1989, legislation provided that administrative regulations adopted by State agencies which apply to the implementation or enforcement of building standards must be submitted to the CBSC for approval.

Each Commissioner is appointed by the Governor, and the composition of the Commission consists of representatives of competing constituencies. The membership includes:

1 - Architect
1 - Mechanical or Electrical Engineer, or Fire Protection Engineer
1 - Structural Engineer
1 - Licensed Contractor
1 - Member of Organized Labor in the building trades
1 - Local Building Official
1 - Local Fire Official
3 - Representatives from the general public (one must be a physically handicapped person)

The building industry is one of the largest in the State. As modern technology is constantly developing in the areas of energy conservation, fire and life safety, worker safety, and seismic safety to name a few, the code is constantly updated and revised. The varied representation of the Commissioners assures that the best interest of all constituencies are addressed, while also helping to ensure that the State's building code does not become a bulky and unusable code. Review, analysis, and approval of these regulations by an independent Commission ensures that only the most necessary regulations are included in the State's building code.

Goal

The goal of the CBSC is to produce for consumers and all of the construction industry, a sensible and usable set of State building standards and administrative regulations that implement or enforce those standards.

This goal has three major thrust:

1. Reduce the quantity of State regulations through the elimination of unnecessary amendments to the model codes.
2. Encourage agency involvement in the model code adoption process.
3. Have the State amendments printed in such a way that it is very clear to the user when to use model code standards and when to use State amendments.

To this end, the Commission has been approving the repeal of many standards. Since 1980, Part 6 of Title 24 has had the content reduced in verbiage and recodified. In the process, over two-thirds of those standards have been repealed.

Duties/Accomplishments

The CBSC is charged with the codification and publication of all building standards of State agencies into one code; resolving conflict, duplication, and overlap in building standards; ensuring consistency in nomenclature and formate in the code; and hearing appeals resulting from the administration of State building standards. The Commission meets an average of four times per year to consider proposed standards for approval, rejection, or return to the departments for revision. Once a proposed addition or revision has been approved by the CBSC, the codification and printing processes begins. The State Building Standards Law requires the Commission to publish edition of Title 24 in its entirety once in every three years, and also to publish annual supplements and California Occupational Safety and Health Act Supplements whenever necessary.

The accomplishments of the Commission include:

- A Coordinating Council, consisting of the seven major State code-writing agencies. The CBSC works with these State representatives on a continuing basis in the development of their building regulations in order to avoid duplication, overlap, and conflict in the State code. Consideration is also given to public interest, cost, fairness, and equitableness of the regulations.

- The CBSC has worked to coordinate the adoption of the latest editions of model codes by the various State agencies.

- The CBSC has vigorously worked on repealing unnecessary building regulations from the code, and seeing that ambiguous regulations are more clearly written.

- The CBSC assists various constituents and special interest groups in their attempts to make their needs known to the various code-writing departments.

- The CBSC has made a concerted effort to educate the public about the State's building code, and assist them in understanding and complying with it.

- The appeal process developed by the CBSC has enabled various interest groups and individuals who are adversely affected by regulations to appeal to the Commission for resolution.

The Commission has contracted with the model code organizations to publish State amendments to the model codes using insert replacement pages. The 1989 editions of the following parts of Title 24 will utilize the model codes distribution system for marketing the State amendments.

Title 24, Part 2 - *Uniform Building Code* (UBC) - The International Conference of Building Officials published the State of California Amendments to the 1988 Edition of the UBC. The amendments are effective July 1, 1989 at the State level and January 1, 1990 at the local level.

Title 24, Part 3 - *National Electric Code* (NEC) - Building News, inc. published the California Electrical Code (CEC) to be integrated with the 1987 NEC. The new CEC is effective July 1, 1989 at the State level and January 1, 1990 at the local level.

Title 24, Part 4 - *Uniform Mechanical Code* (UMC) - The International Conference of Building Officials published the State of California Amendments tot he 1988 Edition of the UMC. The amendments are effective July 1, 1989 at the State level and January 1, 1990 at the local level.

Title 24, Part 5 - *Uniform Plumbing Code* (UPC) - The International Conference of Building Officials published the State of California Amendments to the 1988 Edition of the UPC. The amendments are effective July 1, 1989 at the State level and January 1, 1990 at the local level.

This has the distinct advantage of providing everyone with a readily available, single source for their code books.

Interest Groups

The areas of legislative and consumer interest are almost as diverse as the building code itself. Building regulations involve areas such as health, fire and panic safety, employee safety, energy conservation, and handicapped accessibility. Various consumer and building industry groups are impacted such as apartment owners, architects, engineers, and insurance companies. In addition, a discussion of law regulating the construction industry and of the two methods by which the public can pursue changes to the building code follows.

Statutory Versus Administrative Law

There are two types of law that regulate building construction in California:

I. Statutory Law (Legislation)

  A. The public or the Legislature perceives a need for action to mandate certain results--such as energy conservation in buildings.

B. A statute is passed by the Legislature directing (sometimes creating) a State agency to adopt regulations to achieve certain results--such as creating the California Energy Commission (CEC) and directing them to adopt regulations which will conserve energy.

II. Administrative Law (Regulation)

A State agency such as the CEC establishes public advisory groups that may review or propose energy conservation building standards. Such advisory groups seek consensus among all elements affected--builders, manufacturers, suppliers, architects, engineers, building officials, and the general public. When it seems that a proposed building standard meets most of the concerns expressed by the various groups, it is put into a form for a public hearing.

The proposed regulation, together with an initial statement of reasons, an informative digest, and a copy of a public notice, is sent to the CBSC for approval of the notice and of the completeness of the documents submitted.

After the notice is published, and it is mailed to people who have requested individual notification, a public hearing is held. This hearing can be held no sooner than 45 days after public notice was given.

At the public hearing, individuals can testify in person or submit written comments. Written comments may also be submitted by mail. When the hearing is completed, all comments are made part of an official rulemaking file for the proceedings.

Often, changes are made in response to public comments; sometimes it is necessary to crate a new hearing document and rehear the proposal. A final statement of reasons is prepared in which the adopting agency addresses all comments at the hearings. This entire document, after adoption of the regulation, is submitted to the CBSC.

The Commission reviews the regulations with respect to the nine-point criteria and the APA, and the completeness of the final statement of reasons. If the regulation is approved, it is placed in the appropriate part of Title 24. For example, if an energy conservation standard, it will be placed in Part 2. If it deals with electrical standards, it will be placed in Part 3. Those part of Title 24 that reference model codes, such as Parts 2 and 3, are organized using the same section numbering scheme and format as the referenced model code. Thus, a code user who is used to working with a particular referenced model code can find any State changes.

If a code user or a group of people in the construction industry wish to change a building standard, they should pursue it administratively that is, by regulation. There are very good reasons for this:

1. Changing administrative law provides far better opportunity for public participation in the process.

2. It is less expensive.

3. Should an amendment be necessary in the future, it requires less time to change regulation than it does statue.

4. Legislation may not be recognizable when through both houses.

If a building standard appears to be a problem to a builder, an architect, or anyone else being affected, that person may petition the State agency to correct the problem. The advisory groups then review the petition, and if it has merit, will proceed to propose a change. The change then goes through the same process as the original adoption approval and publication process.

Summary

The regulatory process is now much more complex than in past years. Controversial and complex building standards in the areas of energy conservation, handicapped accessibility, fire and life safety, and seismic safety, present to the Commission a challenge in determining if such regulations are in the public interest. If the standards approved and published by the Commission are not in the public interest, an unreasonable burden could be placed on the public. The resulting confusion would create many problems for the building industry and for the public. The Commission provides a much needed control in the State's building code process.

The progress of the CBSC during the last two years has been substantial; however, there is still much to be accomplished. Some of the more significant task are to: (1) perform a complete review of other California Code of Regulations title to locate defunct building standards or administrative regulations implementing or enforcing building standards; (2) perform a complete review of Title 24 to locate existing regulations that conflict, overlap, or duplicate each other, and (3) develop and publish a newsletter to inform subscribers of proposed adoptions, public hearings and State issues of concern to the building and design industries.

APPENDIX C

CALIFORNIA *STATE BUILDING CODE* ADOPTION AND ENFORCING AGENCIES

[Ref 20:sec. 2-110]

1. **AGR -- Department of Food and Agriculture.**
   Application -- Dairies and place of meat inspection.
   Enforcing Agency -- Department of Food and Agriculture.

2. **BOC -- Board of Corrections.**
   Application -- Local detention facilities.
   Enforcing Agency -- Board of Corrections.

3. **BSC -- State Building Standards Commission.**
   Application -- State building, including buildings constructed by the Trustees of the California State University and Colleges and the Regents of the University of California, where no State agency has the authority to adopt building standards applicable to such buildings.
   Enforcing Agency -- State or local agency specified by the applicable provisions of law.

4. **CA -- Department of Consumer Affairs, State Board of Cosmetology.**
   Application -- Schools of cosmetology and electrology.
   Enforcing Agency -- State Board of Cosmetology.

5. **CEC -- California Energy Commission.**
   Application -- All occupancies.
   Enforcing Agency -- Local building department or the California Energy Commission.

6. **DHS -- Department of Health Services.**
   Application -- Where the Department of Health Services has adopted this code it applies only to organized camps.
   EXCEPTION NO. 1: Applies to laboratory animal quarters.
   EXCEPTION NO. 2: Applies to public swimming pools and organized camps.
   EXCEPTION NO. 3: Apples to radiation protection.

EXCEPTION NO. 4: Applies to commissaries serving mobile food preparation vehicles.

EXCEPTION NO. 5: Applies to wild animal quarantine facilities.

Enforcing Agency -- The department of Health Services and the local health officer.

7. **DOE -- Department of Education.**

Application -- Facilities for exceptional children.

Enforcing Agency -- Bureau of School Planning, Department of Education.

8. **DOT -- Department of Transportation.**

Application -- Quarters for highway relocation assistance.

Enforcing Agency -- Department of Transportation.

9. **HCD/1 -- Department of Housing and Community Development.**

Application -- Hotels, motels, lodging houses, apartment houses, dwellings, employee housing, and factory-built housing.

Access and adaptability requirements for the physically handicapped shall apply to all privately funded apartment houses of five or more dwelling units where an application for a building permit is submitted after the effective date of an application for a building permit is submitted after the effective date of these regulations within a local agency. These regulations do not apply to condominiums, co-ops, and town houses. To determine the total number of dwelling units affected by these regulations, the total number of apartment houses on a building site shall be considered as one building.

Enforcing Agency -- Local building department or the Department of Housing and Community Development.

10. **HCD/2 -- Department of Housing and Community Development.**

Application -- Permanent buildings and accessory building in mobile home parks, and special occupancy parks.

Enforcing Agency -- Local building department or the Department of Housing and Community development.

11. **OSA/AC -- Access Compliance, Office of the State Architect.**

A. Application -- Publicly funded buildings, structures, sidewalks, curbs, and related facilities.

(1) All buildings, structures, sidewalks, curbs, and

related facilities constructed by the use of the State, county, or municipal funds, or the funds of any political subdivision of the State.

(2) All buildings, structures, and facilities, occupied 50 percent or more, which are lease, rented, contracted, sublet, or hired for periods in excess of two years by any municipal county, or State division of government, or by a special district. The determination as to whether the building, structure, or facility is occupied 50 percent or more shall be based upon the usable floor area as defined in the UBC.

(3) All publicly funded living accommodations.
EXCEPTION: This section shall not apply to any living accommodation which prior to July 1, 1982 qualifies for one of the following conditions:
  a. Received a binding, conditional or preliminary commitment of financing from a funding entity.
  b. Applied for a building permit.
  c. Commenced construction.

(4) All publicly funded buildings used for one- or two-family dwelling unit purposes shall conform to the appropriate provisions applicable to living accommodations.

(5) All existing publicly funded buildings and facilities when alterations, structural repairs, or additions are made to such buildings or facilities. This requirement shall only apply to area of specific alteration, structural repairs, or addition, and shall not be construed to mean that the entire structure or facility is subject to Title 24. Compliance shall require:
  a. That a primary entrance to the building or facility and the primary path of travel to the specific area shall be accessible to and usable by handicapped persons.
  b. That sanitary facilities, drinking fountains, and public telephones serving the remodeled area shall be accessible to and usable by handicapped persons.

(6) When the total construction cost of alterations, structural repairs, additions does not exceed a valuation threshold of $50,000., and the enforcing agency finds that compliance with this code creates an unreasonable hardship, compliance shall be limited to the actual work of the project.

(7) Alterations, structural repairs, or additions

consisting of one of the following shall be limited to the actual work of the project:

- a. Altering one building entrance to meet handicapped requirements.
- b. Altering one existing toilet facility to meet handicapped requirements.
- c. Altering existing elevators to meet handicapped requirements.
- d. Altering existing steps to meet handicapped requirements.
- e. Altering existing handrails to meet handicapped requirements.

B. Application --Privately funded public accommodations or facilities.

- (1) Any building, structure, facility, complex, or improved area or portion thereof which is used by the general public and shall include:
  - a. Auditoriums, convention centers, and stadiums.
  - b. Hospitals, including but not limited to, hospitals, nursing homes, and convalescent homes.
  - c. Theaters, restaurants, and shopping centers.
  - d. Hotels and motels.
  - e. Passenger vehicle service stations.
  - f. Offices of physicians and surgeons.
  - g. Office buildings.
  - h. Public curbs and sidewalks.
- (2) Any sanitary facilities which are made available for the public, clients, or employees in such accommodations or facilities.
- (3) Any curb or sidewalk intended for public use that is constructed in the State of California with private funds.
- (4) All existing privately funded public accommodations when alterations, structural repairs, or additions are made to such public accommodations.

Enforcing Agency

- (1) By the Director of General Service where State funds are utilized for any project or where funds of counties, municipalities, or other political subdivisions are utilized for the construction of elementary, secondary, or community college projects.
- (2) By the governing bodies thereof where funds of counties, municipalities, or other political subdivisions are utilized except as otherwise provided.

(3) By the building department of every city, county, or city and county within the territorial are of its city, county, or city and county, where private funds are utilized.

12. **OSA/SSS -- Structural Safety Section, Office of the State Architect.**
Application -- Public elementary and secondary schools, community college buildings, and Essential Services Buildings.
Enforcing Agency -- Structural Safety Section, Office of the State Architect.

13. **OSHA -- Occupational Safety and Health Standards Boards.**
Application -- Places of employment.
Enforcing Agency -- Division of Occupational Safety and Health.

14. **OSH/PD -- Office of Statewide Health Planning and Development.**
Application -- Clinics and health facilities.
Enforcing Agency -- Division of Facilities Development, Office of Statewide Health Planning and Development.

15. **SFM -- Office of the State Fire Marshall.**
Application -- High-rise buildings. Assembly, educational, institutional, and Occupancies. All buildings auxiliary or accessory to an Assembly, educational or institutional occupancy. Organized camps. State owned or occupied buildings including State colleges and universities. Tents, awnings, or other fabric enclosures used in connection with any occupancy. Halfway Houses, existing and new hotels, motels, apartment houses, large family day care homes and new dwellings.
Enforcing Agency -- Local fire authority. State Fire Marshall where no local fire authority exists or where State Fire Marshall assumes jurisdiction by request of the local fire authority; State owned or occupied buildings.

16. **SHB -- State Historical Buildings Code Advisory Board, Office of the State Architect.**
Application -- Qualified historical buildings and structures and their associated sites.

Enforcing Agency -- State or local agency specified by the applicable provisions of law.

17. **YA -- Department of the Youth Authority**.
Application -- Juvenile halls.
Enforcing Agency -- Department of the Youth Authority.

APPENDIX D

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NAVFACENGCOM GUIDE SPECIFICATIONS

DIVISION 0 - BIDDING INFORMATION:

TS-00101	JAN.	1986	BIDDING INFORMATION

DIVISION 1 - GENERAL REQUIREMENTS:

NFGS-01010	JUN.	1987	GENERAL PARAGRAPHS
NFGS-01011	NOV.	1986	ADDITIONAL GENERAL PARAGRAPHS
NFGS-01011C	NOV.	1986	ADDITIONAL GENERAL PARAGRAPHS
NFGS-01013	JUL.	1982	CPM-NETWORK ANALYSIS SYSTEM
NFGS-01400	NOV.	1986	CONTRACTOR QUALITY CONTROL SYSTEM
NFGS-01401	SEP.	1987	CONTRACTOR INSPECTION SYSTEM
NFGS-01560	SEP.	1986	ENVIRONMENTAL PROTECTION
TS-01661	JUN.	1980	TESTING AND BALANCING AIR AND WATER SYSTEMS

DIVISION 2 - SITE WORK:

NFGS-02050	MAR.	1984	DEMOLITION AND REMOVAL
NFGS-02050W	OCT.	1984	DEMOLITION AND REMOVAL
NFGS-02070W	FEB.	1982	REMOVALS AND RELOCATIONS
NFGS-02080	JAN.	1987	REMOVAL AND DISPOSAL OF ASBESTOS MATERIALS
NFGS-02102	AUG.	1982	CLEARING AND GRUBBING
NFGS-02200L	JUN.	1984	EARTHWORK
NFGS-02200P	FEB.	1982	EARTHWORK
NFGS-02221	OCT.	1984	EARTHWORK FOR STRUCTURES AND PAVEMENTS
NFGS-02225	JAN.	1985	EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES
NFGS-02232	JUN.	1985	SELECT-MATERIAL (BASE COURSE FOR RIGID) (AND) (SUBBASE COURSE FOR FLEXIBLE) PAVEMENT
NFGS-02233	NOV.	1985	GRADED CRUSHED AGGREGATE BASE COURSE FOR FLEXIBLE PAVEMENT
NFGS-02234	AUG.	1985	BITUMINOUS BASE COURSE

NFGS-02247	MAR.	1983	PORTLAND CEMENT STABILIZED (BASE) (OR) (SUBBASE) COURSE FOR AIRFIELD, ROADS, AND STREETS
NFGS-02248	OCT.	1985	LIME TREATED SUBGRADE (LIME MODIFIED SOILS)
NFGS-02250	AUG.	1985	SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL
NFGS-02311L	OCT.	1981	PIPELINE CASING UNDER (RAILROAD) (AND) (PAVEMENT)
NFGS-02361	AUG.	1987	ROUND TIMBER PILES (BASIC JUL. 1983)
NFGS-02361L	DEC.	1985	ROUND TIMBER PILES
NFGS-02362	AUG.	1985	ROUND TIMBER-CONCRETE COMPOSITE PILES
NFGS-02363	SEP.	1987	CAST-IN-PLACE CONCRETE PILING, STEEL CASING
NFGS-02367	AUG.	1981	PRESTRESSED CONCRETE PILING
NFGS-02367L	MAR.	1985	PRESTRESSED CONCRETE PILING
NFGS-02368	MAR.	1985	ROLLED STEEL SECTION PILES
NFGS-02369	SEP.	1987	PRESSURE-INJECTED FOOTINGS
NFGS-02369.1	SEP.	1983	STEEP SHEET PILES
NFGS-02371	AUG.	1987	AUGER-PLACED GROUT PILES
NFGS-02383	SEP.	1987	DRILLED FOUNDATION CAISSONS (PIERS)
NFGS-02420	MAY.	1982	STORM DRAINAGE SYSTEM
NFGS-02441	FEB.	1984	UNDERGROUND SPRINKLER SYSTEMS
NFGS-02444	OCT.	1983	FENCE, CHAIN LINK (BASIC OCT. 1984)
NFGS-02452	AUG.	1987	RAILROAD TRACKWORK (BASIC SEP. 1984)
NFGS-02453	JUN.	1987	WELDING CRANE AND RAILROAD THERMITE METHOD
NFGS-02482	NOV.	1986	DREDGING
NFGS-02483	AUG.	1987	WOOD MARINE PILING
NFGS-02485L	JUN.	1985	TURF
NFGS-02491	AUG.	1987	PIER TIMBERWORK
NFGS-02511L	NOV.	1985	BITUMINOUS CONCRETE PAVEMENT
NFGS-02513W	JAN.	1983	ASPHALT CONCRETE FOR VEHICULAR TRAFFIC
NFGS-02541C	NOV.	1986	PAVEMENT WITH BITUMINOUS CONCRETE SURFACE
NFGS-02543	SEP.	1985	COAL TAR SEAL COAT WITH UNVULCANIZED RUBBER
NFGS-02555	SEP.	1987	BITUMINOUS SURFACE TREATMENT
NFGS-02557	JUL.	1984	BITUMINOUS PRIME COAT
NFGS-02558	SEP.	1985	BITUMINOUS TACK COAT

NFGS-02559	OCT.	1983	PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND AIRFIELDS
NFGS-02560	JUL.	1984	BITUMINOUS SEAL COAT
NFGS-02561	OCT.	1984	JOINTS, REINFORCEMENT, AND MOORING EYES IN CONCRETE PAVEMENTS
NFGS-02562	OCT.	1984	RESEALING OF JOINTS IN RIGID PAVEMENT
NFGS-02573	AUG.	1985	BITUMINOUS HOT MIX PAVEMENT
NFGS-02575	MAY.	1986	FOG SEAL
NFGS-02576	SEP.	1985	ASPHALT SLURRY SEAL
NFGS-02577	SEP.	1987	PAVEMENT MARKINGS (AIRFIELDS AND ROADS)
NFGS-02578	JUN.	1986	RUBBER AND PAINT REMOVAL FROM AIRFIELD PAVEMENTS
NFGS-02579	FEB.	1986	REINFORCING FABRIC UNDERSEAL IN ASPHALT OVERLAYS
NFGS-02670	SEP.	1987	ROTARY-DRILLED WATER WELL
NFGS-02682L	JUL.	1985	EXTERIOR FUEL DISTRIBUTION
NFGS-02695L	JUL.	1985	EXTERIOR STEAM DISTRIBUTION
NFGS-02697L	AUG.	1984	EXTERIOR PUMPED CONDENSATE RETURN SYSTEM
NFGS-02698	JUL.	1985	EXTERIOR BURIED PREINSULATED WATER PIPING
TS-02713	DEC.	1982	EXTERIOR WATER DISTRIBUTION SYSTEM
NFGS-02713L	MAR.	1983	EXTERIOR WATER DISTRIBUTION SYSTEM
NFGS-02714	JUL.	1982	EXTERIOR STEAM DISTRIBUTION
NFGS-02714L	MAY.	1983	EXTERIOR STEAM DISTRIBUTION
NFGS-02715L	MAY.	1983	EXTERIOR CONDENSATE RETURN SYSTEM
NFGS-02720L	JUL.	1985	STORM DRAINAGE SYSTEM
TS-02722	OCT.	1981	EXTERIOR SANITARY SEWER SYSTEM
NFGS-02766	JAN.	1985	POND AND RESERVOIR LINERS
NFGS-02930	FEB.	1987	TURF
NFGS-02950	MAR.	1987	TREES, PLANTS, AND GROUND COVERS

DIVISION 3 - CONCRETE:

NFGS-03300	MAR.	1985	CAST-IN-PLACE CONCRETE
NFGS-03300N	JUL.	1987	CAST-IN-PLACE CONCRETE
NFGS-03302	OCT.	1986	CAST-IN-PLACE CONCRETE (MINOR BUILDING CONSTRUCTION)
NFGS-03302N	SEP.	1984	CAST-IN-PLACE CONCRETE (MINOR BUILDING CONSTRUCTION)

NFGS-03302W	SEP. 1984	CAST-IN-PLACE CONCRETE (MINOR BUILDING CONSTRUCTION)
NFGS-03361	APR. 1985	SHOTCRETE
TS-03410	DEC. 1978	PRECAST STRUCTURAL CONCRETE (NON-PRESTRESSED)
NFGS-03411	JUN. 1987	PRECAST CONCRETE WALL PANELS
NFGS-03501	APR. 1987	INSULATING CONCRETE ROOF DECK SYSTEM
NFGS-03730	DEC. 1983	CONCRETE REPAIR USING EPOXY RESIN (CONCRETE), (GROUTS), (AND) (MORTARS)

DIVISION 4 - MASONRY:

NFGS-04200	FEB. 1987	UNIT MASONRY
NFGS-04230	JUL. 1984	REINFORCED MASONRY
NFGS-04235W	MAY. 1985	REINFORCED HOLLOW UNIT CONCRETE MASONRY
NFGS-04250	MAY. 1987	CERAMIC GLAZED STRUCTURAL CLAY FACING TILE AND PREFACED CONCRETE MASONRY UNITS
NFGS-04270	SEP. 1985	GLASS UNIT MASONRY

DIVISION 5 - METALS:

NFGS-05120	APR. 1985	STRUCTURAL STEEL
NFGS-05210	DEC. 1983	STEEL JOISTS
NFGS-05311	MAY. 1983	STEEL ROOF DECKING
NFGS-05313	SEP. 1987	STEEL FLOOR DECKS
NFGS-05400	AUG. 1983	COLD-FORMED METAL FRAMING
NFGS-05500	OCT. 1985	METAL FABRICATIONS

DIVISION 6 - WOOD AND PLASTICS:

NFGS-06100	AUG. 1987	ROUGH CARPENTRY
NFGS-06200	AUG. 1987	FINISH CARPENTRY

DIVISION 7 - THERMAL AND MOISTURE PROTECTION:

NFGS-07110	SEP. 1987	MEMBRANE WATERPROOFING
NFGS-07111	OCT. 1984	ELASTOMERIC WATERPROOFING, SHEET-APPLIED
NFGS-07120	DEC. 1984	ELASTOMERIC WATERPROOFING SYSTEM, FLUID-APPLIED
NFGS-07130	DEC. 1985	BENTONITE WATERPROOFING
NFGS-07140	JUN. 1987	METALLIC OXIDE WATERPROOFING
NFGS-07160	APR. 1987	BITUMINOUS DAMPROOFING

NFGS-07211	JUL.	1981	LOOSE FILL (CELLULOSIC AND MINERAL FIBER) INSULATION
NFGS-07218	MAY.	1985	SPRAY APPLIED CELLULOSE INSULATION
NFGS-07220	JUL.	1984	ROOF INSULATION
NFGS-07221	JUL.	1987	MASONRY WALL INSULATION
NFGS-07722	JUN.	1987	TAMPERED ROOF INSULATION
NFGS-07722N	JUN.	1987	TAMPERED ROOF INSULATION
NFGS-07230	DEC.	1983	PERIMETER AND UNDER-SLAB INSULATION
NFGS-07232	JAN.	1986	CEILING, WALL, AND FLOOR INSULATION
NFGS-07242L	SEP.	1980	MINERAL ROOF FILL
NFGS-07250	MAY.	1987	SPRAYED-ON FIREPROOFING
NFGS-07511	SEP.	1985	PREFORMED METAL (ROOFING) (AND) (SIDING)
NFGS-07512	SEP.	1985	SMOOTH SURFACED BITUMINOUS BUILT-UP ROOFING
NFGS-07513	SEP.	1985	MINERAL SURFACED BITUMINOUS BUILT-UP ROOFING
NFGS-07520	FEB.	1984	PREPARED ROLL ROOFING
NFGS-07530	JUL.	1987	ELASTOMERIC SHEET ROOFING SYSTEM
NFGS-07540	SEP.	1985	FLUID-APPLIED ELASTOMERIC ROOF COATINGS OVER POLYURETHANE FOAM
NFGS-07545	JUL.	1984	SPRAYED POLYURETHANE FOAM FOR ROOFING ;SYSTEMS
NFGS-07600	DEC.	1986	FLASHING AND SHEET METAL
NFGS-07920	AUG.	1981	SEALANTS AND CALKINGS

DIVISION 8 - DOORS AND WINDOWS:

NFGS-08110	FEB.	1986	STEEL DOORS AND FRAMES
NFGS-08120	FEB.	1984	ALUMINUM DOORS AND FRAMES
TS-08210	FEB.	1980	WOOD DOORS
NFGS-08301	NOV.	1982	STEEL SLIDING HANGAR DOORS
NFGS-08310	JAN.	1987	SLIDING FIRE DOORS
NFGS-08331	MAR.	1983	OVERHEAD COILING DOORS
NFGS-08360	MAR.	1986	SECTIONAL OVERHEAD DOORS
NFGS-08367	MAR.	1986	VERTICAL LIFT METAL DOORS
NFGS-08371	APR.	1987	ALUMINUM SLIDING GLASS DOORS
NFGS-08392	MAR.	1986	ALUMINUM STORM DOORS
TS-08510	JAN.	1980	STEEL WINDOWS
NFGS-08520	DEC.	1985	ALUMINUM WINDOWS
NFGS-08529	JUL.	1982	ALUMINUM STORM WINDOWS
NFGS-08610	JUN.	1987	WOOD WINDOWS

NFGS-08710	APR.	1987	FINISH HARDWARE
NFGS-08800	DEC.	1983	GLAZING
NFGS-08900	AUG.	1987	GLAZED CURTAIN WALL SYSTEM

DIVISION 9 - FINISHES:

NFGS-09100	FEB.	1984	METAL SUPPORT SYSTEMS
NFGS-09150	JUL.	1985	PLASTERING AND STUCCOING
NFGS-09200	NOV.	1986	LATHING
NFGS-09215	JUN.	1986	VENEER PLASTIC
NFGS-09250	MAR.	1985	GYPSUM BOARD
NFGS-09310	MAR.	1984	CERAMIC TILE, QUARRY TILE AND PAVER TILE
NFGS-09311	DEC.	1984	CHEMICAL-RESISTANT QUARRY TILE FLOORING
NFGS-09411	SEP.	1983	TERRAZZO, BONDED TO CONCRETE
NFGS-09500	MAY.	1987	ACOUSTICAL TREATMENT
NFGS-09563	APR.	1987	PORTABLE (DEMOUNTABLE) WOOD FLOORING
NFGS-09570	AUG.	1983	WOOD PARQUET FLOORING
NFGS-09650	NOV.	1982	RESILIENT FLOORING
TS-09661	SEP.	1980	VINYL COMPOSITION TILE ON CONCRETE
NFGS-09666	NOV.	1983	INSTITUTIONAL SHEET VINYL FLOORING
NFGS-09670	SEP.	1987	RESILIENT (RESINOUS) FLOORING
NFGS-09680	NOV.	1986	CARPETING
NFGS-09690	JUN.	1986	CARPET TILE
NFGS-09785	APR.	1984	METALLIC-TYPE CONDUCTIVE AND SPARK-RESISTANT CONCRETE FLOOR FINISH
NFGS-09804	OCT.	1984	LINSEED OIL PROTECTION OF CONCRETE SURFACES
NFGS-09809	APR.	1986	PROTECTION OF BURIED STEEL PIPING AND STEEL BULKHEAD TIE RODS
NFGS-09815	MAR.	1986	HIGH-BUILD GLAZE COATINGS
NFGS-09871	SEP.	1984	LINING SYSTEM, INTERIOR, FOR CONCRETE STORAGE TANKS (FOR PETROLEUM FUELS)
NFGS-09872	JAN.	1983	INTERIOR COATING SYSTEMS USED ON WELDED-STEEL TANKS (FOR PETROLEUM FUEL STORAGE)
NFGS-09877	NOV.	1985	COATINGS OF SHEET-STEEL PILING AND OTHER WATERFRONT STRUCTURES

NFGS-09910	OCT. 1982	PAINTING OF BUILDINGS (FIELD PAINTING)
NFGS-09955	OCT. 1986	VINYL-COATED FABRIC WALL COVERING

DIVISION 10 - SPECIALTIES:

NFGS-10152	SEP. 1983	HOSPITAL CUBICLE TRACK
NFGS-10162	MAR. 1987	TOILET PARTITIONS
NFGS-10201	JAN. 1983	METAL (WALL) (AND) (DOOR) LOUVERS
NFGS-10270	JUL. 1983	ACCESS FLOORING
NFGS-10440	OCT. 1985	SIGNS
NFGS-10655	OCT. 1985	ACCORDION FOLDING PARTITIONS
NFGS-10800	OCT. 1983	TOILET AND BATH ACCESSORIES

DIVISION 11 - EQUIPMENT

TS-11162	NOV. 1980	FIXED-TYPE INDUSTRIAL DOCKBOARD
TS-11171	DEC. 1978	INCINERATORS, PACKAGED, CONTROLLED-AIR TYPE
NFGS-11301	MAY. 1985	PACKED, GRAVITY OIL/WATER SEPARATOR
NFGS-11306	JUN. 1986	PACKAGE LIFT STATIONS
NFGS-11334	AUG. 1982	COMMINUTOR
NFGS-11338	SEP. 1987	CIRCULAR CLARIFIER EQUIPMENT
TS-11361.1	SEP. 1980	RECTANGULAR CLARIFIER EQUIPMENT
NFGS-11371	DEC. 1982	TRICKLING FILTER
NFGS-11400	MAY. 1983	FOOD SERVICE EQUIPMENT
NFGS-11441L	MAR. 1984	REFRIGERATED ROOMS (PREFABRICATED PANEL TYPE)
NFGS-11601	APR. 1985	LABORATORY EQUIPMENT AND FUME HOODS
NFGS-11701	JUN. 1981	CASEWORK, METAL AND WOOD (MEDICAL AND DENTAL)
NFGS-11702	SEP. 1984	MEDICAL EQUIPMENT, MISCELLANEOUS
NFGS-11704	APR. 1985	(CASEWORK, MOVEABLE AND MODULAR FOR LABORATORIES AND PHARMACIES) (AND) (MATERIAL HANDLING UNITS) FOR MEDICAL FACILITIES
NFGS-11713	JUN. 1987	SURGICAL LIGHTING FIXTURES
NFGS-11716	FEB. 1986	HYDROTHERAPY EQUIPMENT
NFGS-11722	MAR. 1986	STERILIZERS AND ASSOCIATED EQUIPMENT
NFGS-11730	NOV. 1986	HOSPITAL AND LABORATORY WASHING EQUIPMENT
TS-11744	AUG. 1980	DENTAL EQUIPMENT

NFGS-11757	AUG.	1981	RADIOGRAPHIC DARKROOM EQUIPMENT
NFGS-11770	NOV.	1986	GOVERNMENT-FURNISHED AND CONTRACTOR-INSTALLED EXISTING MEDICAL EQUIPMENT

DIVISION 12 - FURNISHINGS:

NFGS-12322	AUG.	1982	WARDROBES
NFGS-12331	MAR.	1985	PREFABRICATED VANITIES
NFGS-12332	MAR.	1985	WARDROBE STORAGE CABINET (THREE DRAWER)
TS-12391	JAN.	1981	KITCHEN CABINETS (AND VANITY CABINETS)
NFGS-12510	APR.	1985	BLINDS, VENETIAN (AND AUDIO VISUAL)
NFGS-12540	JUL.	1984	DRAPERIES
NFGS-12711	FEB.	1984	THEATER SEATING

DIVISION 13 - SPECIAL CONSTRUCTION

NFGS-13034	JAN.	1987	PREFABRICATED AUDIOMETRIC ROOMS
NFGS-13092	SEP.	1984	X-RAY SHIELDING
NFGS-13121	OCT.	1983	PRE-ENGINEERED METAL BUILDINGS (RIGID FRAME)
NFGS-13217	JUL.	1987	FIBERGLASS REINFORCED PLASTIC LINING SYSTEM, STEEL TANK BOTTOM
NFGS-13411	JUN.	1981	WATER STORAGE TANKS
NFGS-13610	OCT.	1985	SOLAR ENERGY SYSTEM FLAT PLAT COLLECTORS (LIQUID TYPE)
NFGS-13625	FEB.	1982	FLOW-MEASURING EQUIPMENT (SEWAGE TREATMENT PLANT)
NFGS-13657	MAR.	1983	CLEANING PETROLEUM STORAGE TANKS
TS-13765	APR.	1979	RADIO FREQUENCY SHIELDED ENCLOSURES, DEMOUNTABLE TYPE
NFGS-13947	AUG.	1983	ENERGY MONITORING AND CONTROL SYSTEM LARGE SYSTEM CONFIGURATION
NFGS 13948	AUG.	1983	ENERGY MONITORING AND CONTROL SYSTEMS MEDIUM SYSTEM CONFIGURATION
NFGS-13949	AUG.	1983	ENERGY MONITORING AND CONTROL SYSTEMS SMALL SYSTEM CONFIGURATION
NFGS-13950	AUG.	1983	ENERGY MONITORING AND CONTROL SYSTEMS MICRO SYSTEM CONFIGURATION

DIVISION 14 - CONVEYING SYSTEMS:

NFGS-14200	MAR.	1984	ELECTRIC (PASSENGER) (FREIGHT) ELEVATORS
NFGS-14214	FEB.	1984	HYDRAULIC (PASSENGER) (FREIGHT) ELEVATOR
NFGS-14304	JAN.	1984	PORTAL CRANE TRACK INSTALLATION
NFGS-14334	MAR.	1983	MONORAILS WITH MANUAL HOISTS
NFGS-14335	APR.	1982	MONORAIL WITH AIR MOTOR-POWERED HOIST
NFGS-14336	JAN.	1982	CRANES, OVERHEAD ELECTRIC, OVERRUNNING TYPE
NFGS-14622L	OCT.	1985	MONORAILS WITH ELECTRIC POWERED HOISTS
NFGS-14637	JUL.	1984	CRANES, OVERHEAD ELECTRIC, UNDERRUNNING (UNDER 20,000 POUNDS)

DIVISION 15 - MECHANICAL:

NFGS-15011	OCT.	1987	MECHANICAL GENERAL REQUIREMENTS
NFGS-15011L	APR.	1984	MECHANICAL GENERAL REQUIREMENTS
NFGS-15116	JUL.	1982	WELDING PRESSURE PIPING
NFGS-15176	OCT.	1985	STEEL TANKS WITH FIXED ROOFS
NFGS-15200	JUL.	1985	NOISE, VIBRATION, (AND SEISMIC) CONTROL
NFGS-15250	APR.	1987	INSULATION OF MECHANICAL SYSTEMS
NFGS-15250L	APR.	1986	INSULATION OF MECHANICAL SYSTEMS
NFGS-15251	JAN.	1984	INSULATION FOR EXTERIOR PIPED UTILITIES
NFGS-15330	MAR.	1985	FIRE EXTINGUISHING SPRINKLER SYSTEMS (WET-PIPE)
NFGS-15335	MAR.	1985	FIRE EXTINGUISHING SPRINKLER SYSTEMS (DRY PIPE)
NFGS-15340	MAR.	1985	FIRE EXTINGUISHING SPRINKLER SYSTEMS (DELUGE) (PREACTION)
NFGS-15255	SEP.	1985	FUEL GAS PIPING
NFGS-15361	JAN.	1984	CARBON DIOXIDE FIRE EXTINGUISHING SYSTEMS (HIGH PRESSURE)
NFGS-15362	JAN.	1984	CARBON DIOXIDE FIRE EXTINGUISHING SYSTEMS (LOW PRESSURE)
NFGS-15365	FEB.	1984	HALON 1301 FIRE EXTINGUISHING SYSTEMS
NFGS-15371	DEC.	1986	DRY AND WET CHEMICAL EXTINGUISHING SYSTEM

TS-15388	OCT.	1973	SCREENING EQUIPMENT
TS-15392	OCT.	1973	GRIT HANDLING EQUIPMENT
TS-15396	JAN.	1979	PACKAGE SEWAGE TREATMENT PLANT EXTENDED-AERATION TYPE, STEP-AERATION TYPE, AND COMPLETE-MIXING TYPE
NFGS-15400	SEP.	1983	PLUMBING
NFGS-15403	MAY.	1986	MEDICAL GAS SYSTEMS
NFGS-15411	JUL.	1983	COMPRESSED AIR SYSTEM (NON-BREATHING AIRTYPE)
NFGS-15460	JUL.	1984	HOSPITAL PLUMBING FIXTURES
NFGS-15482	FEB.	1987	FIBERGLASS REINFORCED PLASTIC PIPING (FOR PETROLEUM PRODUCTS)
NFGS-15483	AUG.	1985	FUEL OIL HANDLING SYSTEM
NFGS-15521	SEP.	1987	STREAM SYSTEM AND TERMINAL UNITS
NFGS-15540	FEB.	1982	FIRE PUMPS
TS-15609	OCT.	1978	AVIATION FUEL DISTRIBUTION SYSTEMS
NFGS-15612	APR.	1984	GAS DISTRIBUTION SYSTEM
NFGS-15631	SEP.	1981	STEAM BOILERS AND EQUIPMENT (500,000 - 18,000,000 BTU/HR)
NFGS-15632	SEP.	1981	STEAM BOILERS AND EQUIPMENT (18,000,000 - 60,000,000 BTU/HR)
NFGS-15651	APR.	1985	REFRIGERANT CHILLED WATER CONDENSER WATER HOT AND COLD WATER (DUAL SERVICE) PIPING
NFGS-15652	JUL.	1987	CENTRAL REFRIGERATION SYSTEM FOR AIR CONDITIONING
NFGS-15653	JUN.	1984	UNITARY AIR CONDITIONING ;SYSTEMS
NFGS-15705	JUN.	1981	UNDERGROUND HEAT DISTRIBUTION SYSTEMS (PREFABRICATED OR PRE-ENGINEERED TYPES)
NFGS-15711	MAR.	1981	HOT-WATER HEATING SYSTEM
NFGS-15805	SEP.	1984	INDUSTRIAL VENTILATION AND EXHAUST SYSTEMS (DUCTS AND FANS)
TS-15813	OCT.	1980	WARM-AIR HEATING SYSTEMS
NFGS-15822	DEC.	1986	EVAPORATIVE COOLING SYSTEM
NFGS-15850	DEC.	1986	AIR HANDLING AND DISTRIBUTION EQUIPMENT
NFGS-15852.1	JUL.	1985	DUST COLLECTOR, MECHANICAL-CYCLONE TYPE (FLUE GAS PARTICULATE)
NFGS-15852.2	MAR.	1987	DUST COLLECTOR, ELECTROSTATIC PRECIPITATION TYPE (FLUE GAS PARTICULATE)

NFGS-15854	SEP.	1987	DUST COLLECTOR, FABRIC FILTER TYPE (FLYASH PARTICLES IN FLUE GAS)
NFGS-15877	SEP.	1987	DUST AND GAS COLLECTOR, DRY SCRUBBER AND FABRIC FILTER TYPE
NFGS-15895	FEB.	1987	DUCTWORK AND DUCTWORK ACCESSORIES
NFGS-15971	OCT.	1985	SPACE TEMPERATURE CONTROL SYSTEMS

DIVISION 16 - ELECTRICAL:

NFGS-16011	FEB.	1985	ELECTRICAL GENERAL REQUIREMENTS
NFGS-16113	FEB.	1984	UNDERFLOOR RACEWAY SYSTEM
NFGS-16202	OCT.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 1) 500 TO 2,500 KW CONTINUOUS-DUTY UNITS
NFGS-16203	OCT.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 2) 2,501 KW AND LARGER CONTINUOUS-DUTY UNITS
NFGS-16204	NOV.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 3) 300 TO 1,000 KW STANDBY-DUTY UNITS
NFGS-16205	SEP.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 4) 1,001 KW AND LARGER STANDBY-DUTY UNITS
NFGS-16206	OCT.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 5) 300 TO 1,000 KW EMERGENCY-DUTY UNITS
NFGS-16207	NOV.	1981	POWER-GENERATING PLANTS, DIESEL ELECTRIC (DESIGN 6) 1,001 KW AND LARGER EMERGENCY-DUTY UNITS
NFGS-16208	JUL.	1982	DIESEL ENGINE GENERATOR SET (25 -250 KW)
NFGS-16216L	FEB.	1986	DIESEL ENGINE-GENERATOR SET
NFGS-16262	AUG.	1984	AUTOMATIC TRANSFER (AND BYPASS/ISOLATION) SWITCHES
NFGS-16301	APR.	1984	UNDERGROUND ELECTRICAL WORK
NFGS-16301L	NOV.	1982	UNDERGROUND ELECTRICAL WORK
NFGS-16302	SEP.	1987	OVERHEAD ELECTRICAL WORK
NFGS-16302L	MAY.	1987	OVERHEAD ELECTRICAL WORK
NFGS-16304	JUL.	1982	PIER, ELECTRICAL DISTRIBUTION FOR NAVAL STATIONS
NFGS-16305	JUN.	1985	400-HERTZ MEDIUM-VOLTAGE CONVERSION/DISTRIBUTION AND LOW-VOLTAGE UTILIZATION SYSTEMS
NFGS-16321	OCT.	1984	INTERIOR TRANSFORMERS

NFGS-16335	SEP. 1981	TRANSFORMERS, SUBSTATIONS AND SWITCHGEAR EXTERIOR
NFGS-16402	MAR. 1985	INTERIOR WIRING SYSTEM
NFGS-16462	JUL. 1981	PAD MOUNTED TRANSFORMERS (75 KVA TO 500 KVA)
NFGS-16465	MAR. 1983	INTERIOR SUBSTATIONS
NFGS-16475	FEB. 1986	INTERIOR SWITCHGEAR AND SWITCHBOARDS, LOW-VOLTAGE
NFGS-16492	JAN. 1983	MOTOR-GENERATOR SETS, 400 HERTZ
NFGS-16510	NOV. 1983	INTERIOR LIGHTING
NFGS-16530	MAY. 1987	EXTERIOR LIGHTING
NFGS-1560	JUN. 1982	AIRFIELD LIGHTING
TS-16641	MAR. 1979	CATHODIC PROTECTION BY GALVANIC ANODES
TS-16642	MAR. 1979	CATHODIC PROTECTION BY IMPRESSED CURRENT
NFGS-16650	JUN. 1983	RADIO FREQUENCY INTERFERENCE POWER LINE FILTERS
NFGS-16721	DEC. 1982	EXTERIOR FIRE ALARM SYSTEM
NFGS-16722	JUN. 1984	INTERIOR FIRE ALARM SYSTEM
NFGS-16722C	SEP. 1984	FIRE ALARM AND FIRE DETECTING SYSTEM (LOCAL)
NFGS-16722N	FEB. 1980	FIRE ALARM AND FIRE DETECTING SYSTEMS (LOCAL)
NFGS-16723	AUG. 1985	FIRE ALARM SYSTEM RADIO TYPE
NFGS-16727	JUN. 1987	INTRUSION DETECTION SYSTEMS
NFGS-16760	APR. 1983	INTERCOMMUNICATION SYSTEM
NFGS-16782	APR. 1987	(MASTER ANTENNA TELEVISION SYSTEM) (COMMUNITY ANTENNA TELEVISION SYSTEM)
NFGS-16852	NOV. 1986	ELECTRIC SPACE HEATING EQUIPMENT

TOTAL GUIDE SPECIFICATIONS: (NFGS) 318

NOTE: NAVFACENGCOM GUIDE SPECIFICATIONS ENDING IN A LETTER ARE FOR USE BY THE REGIONAL ENGINEERING FIELD DIVISIONS DENOTED BY THAT LETTER.

APPENDIX E

[Ref 46:pp. 16-19]

NAVFACENGCOM DESIGN MANUALS AND MILITARY HANDBOOKS FOR DESIGN CRITERIA

DM-01.01	APR.	1986	BASIC ARCHITECTURAL REQUIREMENTS AND DESIGN CONSIDERATIONS
DM-01.03	MAY.	1985	ARCHITECTURAL ACOUSTICS
DM-01.04	MAR.	1984	EARTH-SHELTERED FACILITIES
DM-02.01	MAY.	1980	STRUCTURAL ENGINEERING-GENERAL REQUIREMENTS
DM-02.02	SEP.	1986	STRUCTURAL ENGINEERING-LOADS
DM-02.03	SEP.	1986	STRUCTURAL ENGINEERING-STEEL STRUCTURES
DM-02.04	SEP.	1986	STRUCTURAL ENGINEERING-CONCRETE STRUCTURES
DM-02.08	DEC.	1986	BLAST RESISTANT STRUCTURES
DM-02.09	OCT.	983	MASONRY STRUCTURAL DESIGN FOR BUILDINGS
DM-03.01	MAY.	1986	PLUMBING SYSTEMS
DM-03.03	JAN.	1987	HEATING, VENTILATING, AIR CONDITIONING AND DEHUMIDIFYING SYSTEMS
DM-03.04	AUG.	1986	REFRIGERATION SYSTEMS FOR COLD STORAGE
DM-03.05	MAR.	1983	COMPRESSED AIR AND VACUUM SYSTEMS
DM-03.06	APR.	1985	CENTRAL HEATING PLANT
DM-03.08	SEP.	1987	EXTERIOR DISTRIBUTION OF UTILITY STEAM, HIGH TEMPERATURE WATER, CHILLED WATER, FUEL GAS, AND COMPRESSED AIR
DM-03.09	MAR.	1986	ELEVATORS, ESCALATORS, DUMBWAITERS, ACCESS LIFTS AND PNEUMATICS TUBE SYSTEMS
DM-03.10	DEC.	1983	NOISE AND VIBRATION CONTROL OF MECHANICAL EQUIPMENT
DM-03.14	DEC.	1983	POWER PLANT ACOUSTICS
DM-03.15	FEB.	1984	AIR POLLUTION CONTROL SYSTEMS FOR BOILERS AND INCINERATORS
DM-03.16	SEP.	1984	THERMAL STORAGE SYSTEMS

DM-04.01	MAR.	1983	ELECTRICAL ENGINEERING-PRELIMINARY DESIGN CONSIDERATIONS
DM-04.02	MAR.	1981	ELECTRICAL ENGINEERING POWER DISTRIBUTION SYSTEMS
DM-04.03	DEC.	1979	ELECTRICAL ENGINEERING SWITCHGEAR AND RELAYING
DM-04.04	APR.	1982	ELECTRICAL ENGINEERING ELECTRICAL UTILIZATION SYSTEMS
DM-04.05	MAR.	1987	400 HZ MEDIUM VOLTAGE CONVERSION/AND LOW-VOLTAGE UTILIZATION SYSTEMS
DM-04.06	DEC.	1979	ELECTRICAL ENGINEERING-LIGHTNING AND CATHODIC PROTECTION
DM-04.07	APR.	1986	WIRE COMMUNICATION AND SIGNAL SYSTEMS
DM-04.09	SEP.	1983	ENERGY MONITORING AND CONTROL SYSTEMS
DM-05.01	APR.	1986	CIVIL ENGINEERING-SURVEYING
DM-05.02	SEP.	1985	CIVIL ENGINEERING-HYDROLOGY
DM-05.03	FEB.	1986	CIVIL ENGINEERING-DRAINAGE SYSTEMS
DM-05.04	MAR.	1986	CIVIL ENGINEERING-PAVEMENTS
DM-05.05	APR.	1977	GENERAL PROVISIONS AND GEOMETRIC DESIGN FOR ROADS, STREETS, WALKS, AND OPEN STORAGE AREA
DM-05.05	MAR.	1981	CIVIL ENGINEERING-TRACKAGE
DM-05.07	OCT.	1979	CIVIL ENGINEERING-WATER SUPPLY SYSTEMS
DM-05.08	OCT.	1979	CIVIL ENGINEERING-POLLUTION CONTROL SYSTEMS
DM-05.09	OCT.	1979	CIVIL ENGINEERING METERING, INSTRUMENTATION AND CONTROL, AND CHEMICAL FEEDING
DM-05.10	SEP.	1986	CIVIL ENGINEERING-SOLID WASTE DISPOSAL
DM-05.12	APR.	1980	CIVIL ENGINEERING-FENCING, GATES, AND GUARD TOWERS
DM-05.14	JAN.	1986	GROUNDWATER POLLUTION CONTROL
DM-06.02	MAY.	1986	POLICY AND PROCEDURES FOR GUIDE SPECIFICATION PREPARATION
DM-07.01	SEP.	1986	SOIL MECHANICS
DM-07.02	SEP.	1986	FOUNDATIONS AND EARTH STRUCTURES
DM-07.03	APR.	1983	SOIL DYNAMICS, DEEP STABILIZATION, AND SPECIAL GEOTECHNICAL CONSTRUCTION
DM-11.01	MAR.	1980	TROPICAL ENGINEERING

DM-12.01	APR. 1983	ELECTRONIC FACILITIES ENGINEERING
DM-12.02	OCT. 1986	HIGH ALTITUDE ELECTROMAGNETIC PULSE PROTECTION FOR GROUND-BASED FACILITIES
DM-13.02	SEP. 1986	COMMERCIAL INTRUSION DETECTION SYSTEMS
DM-14.01	APR. 1986	INTERIOR DESIGN
DM-14.02	DEC. 1986	CARPET SELECTION GUIDE
DM-21.01	NOV. 1984	AIRFIELD GEOMETRIC DESIGN
DM-21.03	AUG. 1978	FLEXIBLE PAVEMENT-DESIGN FOR AIRFIELDS
DM-21.06	APR. 1986	AIRFIELD PAVEMENT DESIGN FOR FROST CONDITIONS AND SUBSURFACE DRAINAGE
DM-21.09	DEC. 1981	SKID-RESISTANT RUNWAY SURFACES
DM-22	AUG. 1982	PETROLEUM FUEL FACILITIES
DM-23.01	AUG. 1982	AIRFIELD LIGHTING
DM-23.02	OCT. 1986	NAVIGATIONAL AND TRAFFIC AIDS
DM-25.01	JUN. 1982	PIERS AND WHARVES
DM-25.02	DEC. 1984	DOCKSIDE UTILITIES FOR SHIP SERVICE
DM-25.04	JUL. 1981	SEAWALLS, BULKHEADS, AND QUAYWALL
DM-25.05	JUL. 1981	FERRY TERMINALS AND SMALL CRAFT BERTHING FACILITIES
DM-25.06	JUL. 1981	GENERAL CRITERIA FOR WATERFRONT CONSTRUCTION
DM-26.01	DEC. 1984	HARBORS
DM-26.02	APR. 1985	COASTAL PROTECTION
DM-26.03	SEP. 1986	COASTAL SEDIMENTATION AND DREDGING
DM-26.04	APR. 1986	FIXED MOORINGS
DM-26.05	JUN. 1985	FLEET MOORINGS
DM-26.06	APR. 1986	MOORING DESIGN PHYSICAL AND EMPIRICAL DATA
DM-27	NOV. 1980	TRAINING FACILITIES
DM-28.01	NOV. 1984	AIRCRAFT MAINTENANCE FACILITIES
DM-28.02	NOV. 1981	SHIPYARD MAINTENANCE FACILITIES
DM-28.03	NOV. 1981	MAINTENANCE FACILITIES FOR AMMUNITION, EXPLOSIVES, AND TOXICS
DM-28.04	SEP. 1985	GENERAL MAINTENANCE FACILITIES
DM-28.05	DEC. 1982	ENVIRONMENTAL CONTROL - DESIGN OF CLEAN ROOMS
DM-29.01	MAY. 1982	GRAVING DRYDOCKS
DM-29.02	JAN. 1982	MARINE RAILWAYS

DM-29.03	NOV.	1981	DRYDOCKING FACILITIES CHARACTERISTICS
DM-32.01	MAR.	1986	OPEN STORAGE
DM-32.02	JUN.	1982	COVERED STORAGE
DM-33.01	JAN.	1987	MEDICAL FACILITIES - PRELIMINARY DESIGN CONSIDERATIONS
DM-33.02	JAN.	1987	NAVAL REGIONAL MEDICAL CENTERS - DESIGN AND CONSTRUCTION CRITERIA
DM-33.03	JAN.	1987	MEDICAL CLINICS AND DENTAL CLINICS DESIGN AND CONSTRUCTION CRITERIA
DM-35	MAR.	1979	FAMILY HOUSING
DM-36.01	JUN.	1982	UNACCOMPANIED PERSONNEL HOUSING
DM-36.02	MAY.	1985	UNACCOMPANIED ENLISTED QUARTERS
DM-36.03	AUG.	1981	UNACCOMPANIED OFFICER QUARTERS
DM-37.03	AUG.	1976	OUTDOOR SPORTS AND RECREATIONAL FACILITIES
DM-37.05	APR.	1985	FAMILY SERVICE CENTERS
DM-37.06	SEP.	1985	CHAPELS AND RELIGIOUS EDUCATIONAL FACILITIES
DM-38.01	OCT.	1986	WEIGHT-HANDLING EQUIPMENT
DM-28.02	APR.	1986	DREDGING EQUIPMENT
DM-38.03	JUL.	1981	YARD CRAFT
DM-38.04	MAY.	1982	PILE DRIVING EQUIPMENT
DM-38.05	MAR.	1981	TOWING NON-SELF-PROPELLED FLOATING STRUCTURES
DM-39	JUL.	1982	HYPERBARIC FACILITIES
DM-50	MAR.	1985	NAVFACENGCOM INDEX TO ENGINEERING AND DESIGN CRITERIA (CUMULATIVE INDEX)
MIL-HBK-1001/2	JUL.	1987	MATERIALS AND BUILDING COMPONENTS
MIL-HBK-1002/5	MAR.	1987	TIMBER STRUCTURES
MIL-HBK-1002/6	JUN.	1987	ALUMINUM STRUCTURES, COMPOSITE STRUCTURES, STRUCTURAL PLASTICS, AND FIBER-REINFORCED COMPOSITES
MIL-HBK-1003/13	JUN.	1985	SOLAR HEATING OF BUILDINGS AND DOMESTIC HOT WATER
MIL-HBK-1003/19	MAY.	1987	DESIGN PROCEDURES FOR PASSIVE SOLAR BUILDINGS
MIL-HBK-1005/13	APR.	1987	HAZARDOUS WASTE STORAGE FACILITIES
MIL-HBK-1006/1	JUL.	1987	POLICY AND PROCEDURES FOR CONSTRUCTION DRAWINGS AND SPECIFICATIONS PREPARATION

MIL-HBK-1006/3	JUN.	1987	POLICY AND PROCEDURES FOR ENGINEERING AND DESIGN CRITERIA MANUAL PREPARATION
MIL-HBK-1006/4	JUL.	1987	POLICY AND PROCEDURES FOR DEFINITIVE SPECIFICATION PREPARATION
MIL-HBK-1008	APR.	1985	FIRE PROTECTION FOR FACILITIES ENGINEERING DESIGN AND CONSTRUCTION
MIL-HBK-1013/1	OCT.	1987	DESIGN GUIDELINES FOR PHYSICAL SECURITY; OF FIXED LAND-BASED FACILITIES
MIL-HBK-1013/6	SEP.	1987	HIGH-SECURITY INTERNAL LOCKING SYSTEM, DESCRIPTION, OPERATION, AND MAINTENANCE
MIL-HBK-1021/4	APR.	1987	RIGID PAVEMENT DESIGN FOR AIRFIELDS
MIL-HBK-1024/2	APR.	1987	HELIUM PLANTS AND STORAGE
MIL-HBK-1025/3	APR.	1987	CARGO HANDLING FACILITIES
MIL-HBK-1028/8	OCT.	1984	PEST CONTROL FACILITIES

TOTAL DM: 112

APPENDIX F

[Ref 38:Appendix A]

REFERENCES IN NATIONAL BUILDING CODES IN THE NAVFACENGCOM MILITARY HANDBOOKS

DM-1.01	*Basic Architectural Requirements and Design Considerations*	References: *Uniform Building Code* *Basic Building Code* *Standard Building Code*
MIL-HDBK-1002/3	*Structural Engineering - Steel Structures*	References: *Uniform Building Code*
DM-2.08	*Blast Resistant Structures*	References: *Uniform Building Code*
DM-3.09	*Elevators, Escalators, Dumbwaiters, Access Lifts and Pneumatic Tube Systems*	References: *Uniform Building Code*
MIL-HDBK-1003/11	*Diesel - Electric Generating Plants*	References: *Uniform Building Code*
MIL-HDBK-1008A	*Fire Protection for Facilities Engineering, Design, and Construction*	References: *Uniform Building Code*

LIST OF REFERENCES

1. Stiglitz, Joseph E., *Economics of the Public Sector*, 2nd ed., W. W. Norton and Company, Inc., New York, NY., 1988.

2. National Association of Home Builders, *Understanding Building Codes and Standards in the United States*, National Association of Home Builders of the United States, Washington, DC., 1988.

3. Commander, Naval Facilities Engineering Command, "U.S. Building Codes and Standards: An Overview," *Military Bulletin 36*, 30 June 1989.

4. Kuchnicki, Richard P., "Communicating Between Code Bodies and Standards Organizations," *ASTM Standardization News*, June 1986, pp. 30-33.

5. Public Law 100-678, *Public Buildings Amendments of 1988*, 17 November 1988.

6. Munekawa, Gary, Criteria Manager, Naval Facilities Engineering Command, Western Division, San Bruno, CA., Interview, 11 August 1989.

7. International Conference of Building Officials, *Uniform Building Code*, Whittier, CA., 1985.

8. International Conference of Building Officials, *1989 Membership Roster*, Whittier, CA., 1989.

9. Building Director, City of Marina, CA., Interview, Marina, CA., 10 August 1989.

10. Building Official, City of San Jose, CA., Interview, San Jose, CA., 11 August 1989.

11. California Building Standards Commission, *Information Bulletin*, Sacramento, CA., 1 August 1989.

12. Department of Housing and Community Development, Division of Codes and Standards, Letter Information Bulletin SHL 89-03, to City Building Officials, et. al., Subject: Adoption Dates of the 1988 Uniform Model Codes, 21 February 1989.

13. Program Manager, State of California, Division of Codes and Standards, Department of Housing and Community Development, Telephone Conversation, Sacramento, CA., 7 September 1989.

14. Program Manager, State of California, State Building Standards Commission, Telephone Conversation, Sacramento, CA., 7 September 1989.

15. International Conference of Building Officials, Interview, Whittier, CA., 21 July 1989.

16. International Conference of Building Officials, *Bylaws*, Whittier, CA., 1989.

17. International Conference of Building Officials, *The ICBO Code Development Process* (Draft), Whittier, CA., 1989.

18. "International Conference of Building Officials," *Building Standards*, v. LVIII, No. 3, p. 2, May-June 1989.

19. International Conference of Building Officials, Telephone Conversation, ICBO, Whittier, CA., 5 September 1989.

20. International Conference of Building Officials, *Building Standards, Part III*, November-December 1988.

21. Title 24, California Administrative Code, *State Building Code*, 1986.

22. California Building Standards Commission, *California Building Standards Commission Information Sheet*, Sacramento, CA., June 28, 1989.

23. Program Manager, California State Building Standards Commission, Telephone Conversation, Sacramento, CA., 13 September 1989.

24. Program Manager, California State Building Standards Commission, Telephone Conversation, Sacramento, CA., 18 September 1989.

25. Program Manager, State of California, Department of Housing and Community Development, Division of Codes and Standards, Telephone Conversation, Sacramento, CA., 13 September 1989.

26. Program Manager, State of California, Department of Housing and Community Development, Division of Codes and Standards, Telephone Conversation, Sacramento, CA., 19 September 1989.

27. International Conference of Building Officials, *State of California 1989 Amendments, Uniform Building Code*, Whittier, CA., 1989.

28. Moore, William B., and John H. Cable, *Better Facilities Through Design Standardization*, Logistics Management Institute, Bethesda, MD., March 1986.

29. Department of Defense, *Military Handbook 1006/2: Policy and Procedures for Guide Specification Preparation*, Washington, DC., 31 January 1989.

30. Logistics Management Institute, *Study of the Use of Commercial Specifications: Preliminary Report*, June 1985.

31. Naval Facilities Engineering Command, Western Division, *A-E Guide for Architect Engineer Firms Performing Services for the Department of the Navy: Western Division, Naval Facilities Engineering Command*, San Bruno, CA., August 1987.

32. Director of Construction, Office of the Secretary of Defense (Manpower, Installations, and Logistics), Memorandum For, 27 June 1985.

33. Mundell, Richard, Specifications Branch Manager, Naval Facilities Engineering Command, Chesapeake Division, Telephone Conversation, Washington, DC., 26 September 1989.

34. Lau, Joe, Specifications Division, Naval Facilities Engineering Command, Pacific Division, Pearl Harbor, HI., Telephone Conversation, 2 October 1989.

35. Bogue, Bill, Naval Facilities Engineering Command, Atlantic Division, Norfolk, VA., Telephone Conversation, 4 October 1989.

36. Tedrow, Dave, Naval Postgraduate School, Public Works Department, Design Division, Interview, Monterey, CA., 3 October 1989.

37. Department of Defense, *Military handbook 1006/3A: Policy and Procedures for Engineering and Design Criteria manual Preparation*, Washington, DC., 31 March 1989.

38. Naval Facilities Engineering Command Letter DS02A/REC:11014.5 to Naval Facilities Engineering Command, Western Division, et. al., Subject: Design Criteria and Model Building Codes, 3 August 1989.

39. American National Standards Institute, *Procedures for the Development and Coordination of American national Standards*, ANSI, New York, NY., April 1983.

40. Rausch, George, Naval Facilities Engineering Command, Western Division, Interview, San Bruno, CA., 11 August 1989.

41. International Conference of Building Officials, Telephone Conversation, ICBO, Whittier, CA., 5 October 1989.

42. Boureston, Jack, Associate Mechanical Engineer, Lee and Associates, Telephone Conversation, Monterey, CA., 2 October 1989.

43. Rhoda, George, Keeble and Rhoda, AIA, Telephone Conversation, Monterey, CA., 3 October 1989.

44. Bianchini, Hugo, Hugo Bianchini, AIA, Telephone Conversation, Monterey, CA., 3 October 1989.

45. Haberkorn, Charles, Vice President of Sales, Hampshire Construction, Telephone Conversation, Monterey, CA., 6 October 1989.

46. Department of Defense, *Military Bulletin 34 - Engineering and Design Criteria for Navy Facilities*, Washington, DC., 20 November 1987.

47. Naval Facilities Engineering Command Letter DS02A/REC to Naval Facilities Command, Western Division, et. al., Subject: Building Codes Criteria, November 1988.

BIBLIOGRAPHY

American Society for Testing and Materials, *ASTM and the OMB Circular A119, Federal Participation in the Use of Voluntary Standards*, ASTM, Philadelphia, PA., 1983.

Brackett, David E., "From Committee to Code," *ASTM Standardization News*, June 1986, pp. 42-43.

Cimorelli, Nicholas, C., *Standardizing Construction Between Industry and Government*, M.S. Thesis, Naval Postgraduate School, Monterey, CA., December 1987.

Davis, Gerald, "Overall Performance of Buildings," *ASTM Standardization News*, June 1985, pp. 42-43.

Ellis, Wayne and Morris Lieff, "Asbestos in Buildings, What Standards are Needed?," *ASTM Standardization News*, June 1985, pp. 44-49.

Enright, Cicely F., "Standard Profile: See Through Windows and Doors," *ASTM Standardization News*, June 1985, p. 50.

Fahnestock, Brian E., *The Application of Cost/Benefit Analysis in the Development of Voluntary Standards*, M.S. Thesis, Naval Postgraduate School, Monterey, CA., June 1986.

Field, Charles G., and Steven R. Rivkin, *The Building Code Burden*, Lexington Books, Lexington, MA., 1975.

Heilstedt, Paul K., "Codes and Standards - Putting Their UseInto Perspective," *ASTM Standardization News*, June 1986, pp. 36-39.

Hemenway, David, *Industrywide Voluntary Product Standards*, Ballinger Publishing company, Cambridge, MA., 1975.

Hinds, Thomas L., "Standards and the Naval Facilities Engineering Command," *ASTM Standardization News*, April 1988, pp. 40-43.

Jones, Rudard A., "Standards for Performance of Building Construction," *ASTM Standardization News*, June 1985, pp. 30-32.

Little, Arthur D., *Report to National Institute of Building Sciences, A Study of the Experiences, Needs, and Attitudes of User of Building Product Approval Processes*, Arthur D. Little, Inc., 1985.

National Association of Home Builders, *Understanding Building Codes and Standards in the United States*, National Association of Home Builders of the United States, Washington, DC., 1988.

Ryan, John E., "Building Without Standards - It Cannot Be Done," *ASTM Standardization News*, June 1986, pp. 40-41.

Schoumacher, Bruce, *Engineers and the Law, An Overview*, Van Nostrand Reinhold Company, New York, NY., 1986.

Siegan, Bernard H., *Regulation, Economics, and the Law*, Lexington Books, Lexington, MA., 1979.

Yorkdale, Alan H., "Performance of Exterior Building Wall System," *ASTM Standardization News*, June 1985, pp. 33-35.

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